JOURNAL

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FRANKLIN INSTITUTE

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DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

FEBRUARY, 1832.

TO THE EDITOR OF THE JOURNAL OF THE FRANKLIN INSTITUTE.

NOTES OF AN OBSERVER.—*An examination of some remarks upon the application of water to wheels, which appeared in the 4th volume of this Journal.* *By* JAMES P. ESPY.

DEAR SIR,—In the Journal of the Franklin Institute, vol. 4, p. 166, there are some very judicious "Remarks upon Water Wheels, and upon some prevailing errors respecting the Application of Water as a Motive Power." But upon reading that part of the essay which relates to our works at Fair Mount, I was surprised to find a disparity between the power and the effect so great as three to one. Upon examining the principles on which the writer proceeded to deduce this unexpected result, I could find no inaccuracy sufficient to justify me in the conclusion that the writer was materially wrong, except in the quantity of water actually discharged upon the wheel in twenty-four hours. The method of calculating this quantity is not given by the writer, and the presumption is, that a due allowance has not been made for the "contracted vein."

According to the experiments of Venturi, confirmed by experiments of the Franklin Institute, not yet published, the area of the "contracted vein" is to the opening in the forebay through which the water is discharged upon the wheel, as 625 to 1000. Now as the velocity due to the head of pressure is at the "contracted vein," and not at the opening in the forebay, in calculating the quantity of water issuing on the wheel, the area of the "contracted vein" must be used.

In making the calculation on this principle, I find that the quantity of water discharged through gate No. 1, fifteen feet by seven and a half inches, in twenty-four hours, under a one foot three and three-fourths inch head, which gives a velocity at the contracted vein of nine feet per second, is about 28,000,000 gallons. Gate No. 3, which is sixteen feet by six and a half inches, gives a little less discharge in twenty-four hours, namely 27,630,000 gallons.

Now if one million and one-third gallons are raised into the reservoir ninety-six feet, above the level of the forebay, by each of these wheels, in a day, with a head and fall of eight feet, the power will be to the effect in the first wheel as one to 0.57; and in the other wheel as one to 0.58; whereas, the effect given by the writer mentioned above, is to the power only as $0.33\frac{1}{3}$ to 1.

The writer has also estimated too high the retarding influence of the inertia of the water put in motion by the buckets with a velocity equal to the difference of the velocity of the bucket, which is twelve feet, and the velocity of the water in the direction of the circumference of the wheel. This difference, on the supposition that the water comes on the wheel one foot from the surface, at an angle of 45°, is $6\frac{1}{3}$ feet.

The whole loss of power, he says, may be estimated thus: "The velocity of the water in the required direction, is that which is due to a fall of $5\frac{2}{3}$ inches.

Immediately on striking the wheel, it receives a velocity due to a fall of 27 inches.

The difference indicates the power expended by the wheel in giving it that velocity, - - - - -	$21\frac{1}{3}$ inches.
The water comes on the wheel below the surface of the dam, - - - - - - -	12 inches.
Total loss, - - - - - -	$33\frac{1}{3}$ inches.

It appears to me that the following method of calculating is the true one.

The velocity of the water in the required direction, is $5\frac{1}{2}$ feet.

Immediately on striking the wheel, it receives an additional velocity of $6\frac{1}{2}$ feet, due to a head of - -	8 inches.
The water comes on the wheel below the surface of the dam, - - - - - - -	12 inches.
Total loss, - - - - - -	20 inches.

It may appear paradoxical, and to a hasty examination of the subject, inconsistent with the laws of hydrodynamics, to say that a wheel can move under any circumstances, with a velocity of twelve feet a second, without losing twenty-seven inches of power, which is the head due to this velocity; more especially if the water issues obliquely upon the wheel, as in the present case. But if it is recollected that water produces a greater mechanical effect by gravity than by impulse, the paradox will vanish: for in the case we are now considering, the water, by lying on the buckets while descending eight

inches, will, by its gravity, produce as great an action on the wheel, as the reaction had been by impulse.

Thus it appears that there is an actual gain by letting the water on the wheel under a head of less than 27 inches, even at the expense of having to overcome its inertia by impulse: for if the water is let on the wheel under a head of 27 inches, it is acknowledged there would be a loss of 27 inches of the power, even if it could be let on in the required direction. It becomes then a problem worth investigating, at what point it is best to let the water on the wheel, provided the wheel must move with a velocity of 12 feet a second.

I find by making the calculation, that the difference of the loss of power will not amount to two inches in the different heads from three to fifteen inches, and that the maximum is when the water is let on under a head of about nine inches, when the whole loss of power would be 22 inches.

If it were possible to let the water on in the direction of the tangent, the maximum would be under a head of $6\frac{3}{4}$ inches; for under this head it would issue with a velocity, in the required direction, of six feet a second, and immediately upon striking the wheel, it would receive an additional velocity of six feet, which is due to a head of $6\frac{3}{4}$ inches; and in this case the whole loss of power would be only $13\frac{1}{4}$ inches, when there would be a loss of 27 inches if it should be let on under a head of 27.

These calculations are made on the supposition of the writer, that the water is received on the wheel at the instant of passing through the gate, which, however, is not the fact; for the lower part of gate No. 1, is $19\frac{1}{2}$ inches below the head, and the water cannot be said to be on the wheel above this point so as to operate on it by gravity.

The middle of the gate is $15\frac{3}{4}$ inches below the head, which gives a velocity of $9\frac{1}{2}$ feet per second, or about $6\frac{3}{4}$ in the direction of the tangent; therefore the water on striking the wheel immediately receives an additional velocity of $5\frac{1}{4}$ feet, which is due to a head of $5\frac{1}{2}$ inches, which being added to $19\frac{1}{2}$ gives the whole power lost $25\frac{2}{3}$ inches.

This is nearly 26 per cent. of the whole power, and this being added to the 57 per cent. effect before calculated, gives 83 per cent. of the power accounted for; therefore there remains 17 per cent. of the power for waste, friction, and inertia.

By inertia I mean the force necessary to put the water in motion when it is retarded at the bends of the tube. If we suppose that all the retardations which it experiences amount to one complete stop, the loss of power is to be calculated from the velocity of the water in the tube; this velocity is two feet and one-sixth per second, which is due to a head of one inch, or nearly one per cent. of the whole power. If the velocity in the tube were double, the loss of power would be four times as great for one stoppage, and in general the loss of power from inertia is directly as the number of stoppages multiplied by the square of the velocity.

J. P. Espy.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

An inquiry into the probable influence of the Dew Point upon Health.

By JAMES P. ESPY.

IT appears by the meteorological journal for December, that the "dew point" has been very low, its mean for the whole month, being 10° Fah. ranging from 4° below zero to 28° above.

Whether the influenza, which has prevailed during that period was caused by the extreme dryness of the air, and consequent rapid abstraction of moisture from the lungs, can only be determined by numerous observations. It is not unreasonable to suppose that some effect is produced on the human system by the great difference in the quantity of vapour exhaled from the lungs at different "dew points." It is the prerogative, and I may add, the duty, of the physician, to investigate what that effect is. Having the subject before me only as a meteorologist, I shall not encroach upon that prerogative; yet as "the sciences are of a sociable disposition, and flourish best in the neighbourhood of each other," I hope what I have to say, will aid, as well as stimulate, the physician, to investigate the phenomenon, as connected with health and disease.

I shall proceed to show that 5446 grains, (about three-quarters of a pound avoirdupois,) of water, are evaporated from our lungs in twenty-four hours, when the dew point is 0°, more than when it is 74°, the highest it rose during the summer.

According to the latest and most approved experiments, a man, at a mean, makes twenty inspirations in a minute, drawing in forty cubic inches of air each time, therefore the number of cubic inches inspired in a day will be 1152000. Now, when the dew point is zero, according to the experiments of Gay Lussac and Dalton, 1152000 cubic inches of air, contain 518 grains of vapour. This, therefore, is the quantity that enters the lungs in a day with the air inspired. If this quantity be subtracted from the whole quantity expired, the remainder will be the quantity actually evaporated from the lungs.

The dew point of the breath at all seasons, as any one may know by breathing on a tumbler of water, is 94° of Fah. and the number of grains of vapour in 1152000 cubic inches of air, when the dew point is 94°, is 10828. Subtract the 518 grains which are inspired from the 10828 expired, and the remainder, 10310 grains is the quantity actually turned into vapour in the lungs, when the dew point of the atmosphere is zero; equal to 1.473 pounds avoirdupois.

Again, when the dew point in the summer is 74°, the 1152000 cubic inches of air, which are inhaled in a day, contain 6004 grains of vapour; but as the dew point of the breath in summer is the same as in winter, namely 94°, if we subtract the 6004 grains inspired, from the 10828 expired, there will be left 4824 grains, the actual quantity turned into vapour in the lungs when the dew point of the atmosphere is 74°, and this, as was mentioned above, is 5446 grains less than the quantity evaporated when the dew point is zero, and is a little more than three quarters of a pound avoirdupois.

It will be seen also, by examining the calculation made above, that the quantity of moisture taken into the lungs in a day by inspiration is nearly twelve times more when the dew point is zero, than when it is 74°. The exsiccating power of respiration in the former case must be very great.

The refrigerating power of respiration due to vaporization alone in the lungs, may be thus estimated. It is known by experiment that water, at all temperatures, absorbs one thousand degrees of Fah. in turning to vapour, and that ice, at thirty-two, absorbs in melting one hundred and forty degrees; therefore if the 1.473 pounds of water which are evaporated from the lungs when the dew point is zero, be multiplied by one thousand, and the product be divided by one hundred and forty, the quotient will be ten; the number of pounds of ice at thirty-two which would be melted in a day, by the caloric given out by the lungs employed in vaporization alone; a quantity which would be sufficient to raise $15\frac{3}{4}$ pounds of iron from zero to 800 of Fah.

If to this be added the quantity of caloric given out by the lungs in heating 1152000 cubic inches, or fifty two pounds of air, employed in respiration per day, from 55 to 98, supposing the capacity of the air expired the same as of that inspired, viz. 0.26 of that of water, it will be sufficient to raise four pounds of iron from zero to 800° Fah., amounting in all to $19\frac{3}{4}$ pounds.

As the experiments, however, on the capacity of air expired from the lungs are not decisive, the latter calculation can only be considered hypothetical.

If the capacity of the air expired, as Dr. Black thought, is greatly less than that of the air inspired, caloric might be given out from the air in respiration; but later experiments do not confirm this theory.

When the air is extremely dry, which it must be when it is extremely cold, may it not be important to our health to guard against its drying influence on our bodies, by evaporating water in our parlours?

May not the pernicious influence of those winds which blow over the dry sands of Arabia, be caused as much by their dryness, as by their heat?

Why does the camel, when he feels the withering influence of those winds, thrust his nose down in the sand? May it not be, in part, to obtain a moister air to breathe, as well as to avoid the fine sand carried in the wind? If so, the traveller might obtain security by breathing through a moistened sponge.

How is the economy of nature to be explained in causing us to evaporate more moisture from the lungs in winter than in summer? Or is it intended that we should raise the dew point in our parlours as we do the temperature, by artificial means?

These questions can only be answered by a long course of experiments, but the solution will amply reward the most patient investigation.

J. P. Espy.

FRANKLIN INSTITUTE.

Extracts from the Report of the Judges appointed to examine the Cotton Goods deposited at the Seventh Exhibition of the Franklin Institute in October*, 1831.

The display of prints this year, although not extensive, was sufficient to show that this important branch of the cotton manufacture is steadily improving, and promises ere long to rival the best productions of foreign markets. Calicoes were exhibited from the different establishments of Andrew Robison, *P.*, Everett & Goddard; the Merrimack, Taunton, Fall River, and Eagle Print Works. The quality of the goods manufactured at several of these concerns is too well known to require the special and particular notice of the committee, and they therefore remark generally, that the colours appeared to be good, and the printing executed with neatness and accuracy. The dark chintzes exhibited by the Merrimack Company were much admired for their style and beauty; but the committee were of opinion that the premium should be awarded to those of Andrew Robison for their fineness, colouring, and elegance of execution.

The two blue prints from the Eagle Works, *P.*, were the best and finest exhibited, and the committee consider them entitled to the premium offered by the Institute for this article.

Of furniture chintzes there was a deficiency in the quantity exhibited, but the samples from the Merrimack Manufacturing Company were sufficient to show that with the same taste and skill which they display in their other fabrics, they may also excel in this article.

The committee pass over the sheetings and shirtings from the manufactories of J. & B. Marshall, Philip Allen, Slater's steam mill, Robert Rogerson, and J. Fisher, with the remark that the samples generally were creditable to the makers, but that if any preference is to be given, it should be awarded to the Messrs. Marshall for the evenness, regularity, and excellence of their fabrics.

Samples of cambric muslins were exhibited from the Rockland Manufacturing Company, J. & B. Marshall, and Philip Allen. The

* In publishing extracts from the reports of the judges appointed at the last exhibition, the committee on premiums and exhibitions desire it to be understood, that the gentlemen whose names are attached to the several reports, are alone answerable for their contents. The committee have, in almost all instances, adopted the suggestions of the judges; in a few cases, however, information that was in their possession, from other sources, has induced them to alter or omit some of the decisions. In such instances, the committee have acted upon their own responsibility, and in all cases, without any intention to cast the least slight upon the judges, whose able, kind, and disinterested discharge of arduous and responsible duties, is fully appreciated by the committee, as well as by the Institute and by the public at large. It will be no cause of surprise if a few expressions of individual opinions, somewhat inconsistent with the general views of the Institute, should occasionally be found in reports necessarily drafted in the hurry of a crowded and highly popular exhibition, by gentlemen, some of whom not being members of the Institute were but imperfectly acquainted with its peculiar objects. The letter *P.* indicates the award of a premium; those of *h. m.* of an honorary mention.

Institute, aware of the importance of encouraging the manufacture of this article, offered a premium for the best sample of $\frac{6}{4}$ cambrics made of yarn from No. 40 to 120, but the committee regret that the quality of those exhibited did not, in their opinion, entitle them to the premium.

Checks were exhibited by the Pennsylvania Institution for the Deaf and Dumb, by A. Clegg and James Rennie. These samples were all of good quality, and their colour the best indigo blue; but in point of beauty, fineness, and finish, a piece manufactured by C. Vancourt, (*h. m.*) one of the pupils of the Institution aforesaid, was deemed worthy of special commendation.

Of tickings the exhibition was not large. Samples, however, were noticed from the manufactories of J. Stetson, the Taunton and the Assanpink companies, all of which were good of their grades, and creditable to those who made them.

The manufacture of Canton flannels, both white and coloured, is annually increasing, and as it consumes a large portion of the raw material, the committee deem it worthy of particular encouragement. They were pleased therefore to find that the Institute had offered a premium for this article, and having examined the samples made by the Blockley Works, *P.* Dennis Kelly, John Waters, and Joseph Ripka, they recommend that the medal be awarded to the former.

Of coloured cambrics, a considerable quantity of which is now annually consumed, no samples were exhibited except from the manufactory of Joseph Ripka. His black cambrics were beautiful specimens of this article, but the pinks, and other colours, were deficient in brilliancy, and in this respect inferior to the imported.

In pursuing their examination of cotton goods, the committee observed with much pleasure several samples of canvass from the manufactory of John Colt, *P.* the character of which, for strength, durability, and usefulness for maritime purposes is now well established, and is eminently deserving of public encouragement.

Samples of ginghams were exhibited from the manufactories of J. H. Roe, Jno. Steel, *P.* and Huster & Buchanan, which, although evincing a state of improvement in this branch of the cotton manufacture, are yet far behind those imported from abroad. The committee are of the opinion that Mr. Roe's samples are the best, but the quantity not being sufficient to entitle him to the medal, they recommend that if it be awarded at all, it be given to J. Steel, whose exertions as a manufacturer deserve encouragement.

The American nankeens manufactured by Collet & Smith, *P.* from cotton produced on the plantation of J. Forsyth, *P.* of Georgia, were examined with much pleasure, because their colour is said to stand the severest tests, and in that case they bid fair to become an excellent substitute for the India nankeens.

Samples of cotton drawers and hose, made by the Newburyport Hose Manufacturing Company, *P.* being the first of the kind exhibited here in any quantity, claimed the special notice of the committee, as being substantial and well made, and as constituting another branch of cotton manufacture in this country.

Of cotton counterpanes a description of goods of which large quan-

tities are annually imported, and the manufacture of which, therefore, in this country, should be specially encouraged, but few samples were exhibited. Those manufactured by William Robinson were of good quality, and the one exhibited by Miss Richardson was a handsome specimen of female ingenuity.

The Britannia handkerchiefs exhibited by J. F. Simmons were handsome samples of our improvement in this branch of manufacture, but not being square are liable to the objection so often urged against those which are imported, and are therefore precluded from receiving the premium which had been offered.

The committee believing that the establishment of manufactories for cotton goods in the southern states will promote their interests, were much pleased to observe samples of blue brochelles, made at Richmond, in Virginia, by Cunningham & Anderson, *P.* These goods are well calculated for cheap wearing apparel, and being stout and well made will supply a desideratum.

The Marseilles vestings from the Rockland Manufacturing Company, although coarse, are worthy of notice as being the first of the kind exhibited at the Institute, and as affording an earnest of greater improvement in this species of manufacture.

Samples of Rouen cassimeres, cotton diapers, and fancy curtain muslins, were exhibited by Joseph Ripka, whose skill and enterprise as a manufacturer of various descriptions of goods, are too well known to require any special notice from this committee.

The jaconet handkerchiefs made by J. Smithurst, *h. m.* are entitled to encouragement, but if his exertions were applied to the production of a finer article, they would be more likely to be crowned with success.

As connected with cotton goods the committee beg leave to express their approbation of two copper rollers, designed for calico printing, from the manufactory of Messrs. Merrick & Agnew, and one from the shop of Mr. M. W. Baldwin. These gentlemen are well known as mechanists, and the different articles of their manufacture, the committee believe, are among the best made in the country.

In concluding this report, the committee cannot but regret that its length, already too extended, prevents them from noticing particularly several quilts, bed spreads, shawls, and other articles, the production of female skill and ingenuity, which were much admired for the beauty and taste displayed in their fabrication.

Jno. B. Trevor,
William Norris, jr.
Geo. L. Oliver,
Durden B. Carter.

Extract from the Report of the Committee on Woollens.

The undersigned, a committee of judges appointed by the Franklin Institute to examine and report upon such woollen goods as should be deposited at their Seventh Annual Exhibition, with a view to award to

those deserving of them the premiums offered in their printed circular, make the following report, viz:

No. 237. Four pieces blue satinets, from the Rock Manufacturing Company, deposited by Hacker, Brown & Co., the only lot of blue satinets exhibited; these are a very superior article, and an excellent specimen of the perfection to which this manufacture has been brought. The committee feel somewhat surprised that there should have been no competition for the premium on this article, knowing as they do, that there are many other manufacturers who produce the same description of goods.

No. 188. (*h. m.*) Five pieces mixed satinets, manufactured by Houston & Greene, Groveville, deposited by the makers. We consider this the best specimen of the article exhibited; the mixtures are remarkably well done; the fabric is strong and well cleaned from all impurities and imperfections.

No. 216. The eight pieces mixed satinets from the factory of S. Shove & Co., deposited by J. & M. Brown & M. D. Lewis, are of stout fabric, and show a handsome variety of colours. We observe no particular improvement in their manufacture; they have always had a fair reputation in the market, which is fully sustained by the lot now exhibited.

No. 397. We noticed one piece of olive satinet made by N. E. Russell & Co., Greenfield, Massachusetts, deposited by Fales & Lathrop; it is a good specimen.

There were no satinets exhibited to obtain the seventy-first premium on the printed circular.

No. 91. One piece blue cloth, No. 9168, 22¼ yards, not stated where, nor by whom, manufactured;* it is a fair specimen of well dyed and well finished cloth, and the best piece exhibited.

There were three pieces of black cloth exhibited of nearly equal value to the blue, but with nothing in their finish or fabric deserving of particular notice.

No. 101. Three pieces blue cloths from the Salmon Falls Manufacturing Company, deposited by C. C. Haven, and labelled at $3 per yard; this is a stout fabric and pretty well finished article, but as we understand cloths are declining in value, it appears that this is made of coarser wool than should be put into cloths of that value, even at the present advanced price of the material; the colouring in some of the pieces is imperfect; this was the only specimen offered at the price.

No. 110. Two pieces fancy coloured cloths, 30¾, deposited by Lewis & Whitneys, manufactured by the Great Falls Manufacturing Company. These were well made and handsomely coloured and finished; we consider them a handsome specimen of American cloth, and deserving of notice—we did not see any other fancy cloths worthy of particular observation.

No. 23. *P.* One piece exhibited out of a parcel of ten pieces mixed cloth, from the Oxford Manufacturing Company, deposited by C. C.

* Since ascertained to be by the Glenheim Manufacturing Company; it was deposited by C. C. Haven.

Haven, said to be of American wool, it is the best specimen of cloth we were called to notice, and will vie with any of foreign manufacture as to texture, finish, and mixture, in all of which it bears ample testimony to the skill and ability of the maker.

No. 143. Three pieces Rouen cassimere, cotton and wool, from the well known manufactory of Jos. Ripka; this is a superior article of the kind, and deserving of notice.

No. 111. *P.* Five pieces merino cassimere, manufactured at Lowell, Mass. by the Middlesex Company, made of cotton and wool, in imitation of the British article of same description; we consider them the best specimen of men's summer wear exhibited; they are in every respect equal to the imported article, and we are highly gratified to witness the great perfection both of texture and finish, as well as the superior style of putting up, exhibited in this lot, which we think deserving of every commendation.

No. 141. *P.* One piece green summer cloth, cotton and worsted, manufactured by Joseph Ripka, *the only imitation of the English of this description we have ever seen;* we think the manufacturer deserving of especial commendation and notice, as well for this particular article, as for his manufactures in general, which stand deservedly high in all the markets of the union.

No. 53. *P.* Four pieces white gauze flannels, manufactured by J. & T. Kershaw, Blockley, Pennsylvania. This is the finest specimen of American gauze flannel which has ever come under our notice; the wool is of the finest description, and the goods are remarkably well made, but they show rather a bluish tinge in the colour, which should be obviated in any future manufacture of the article; we could not ascertain whether the wool was American or foreign.

No. 22. *P.* We noticed with much pleasure the great variety of flannels from the Salisbury Manufacturing Company, deposited by C. C. Haven; they exhibited all the different kinds and qualities made by this company, and show a decided improvement in their manufacture, *we consider them in every respect equal to the imported article,* and entitled to especial notice; the scarlets were particularly brilliant and rich in colour.

There was not a single piece of baize exhibited, we know that this article is extensively manufactured, and are surprised that there was no competition for the premium. These remarks will also apply to drab cloths, of which there was no specimen exhibited.

No. 24. *P.* Two pair white Mackinaw blankets from the Buffalo Manufacturing Company, deposited by C. C. Haven; it is the only parcel of this article exhibited; it is a fair specimen, and shows the ability of the manufacturer to make a blanket which will in all respects compete with the foreign article; it is a branch of trade deserving of encouragement, and although we do not perceive any particular improvement in this specimen over others which we have seen in previous years, yet we cannot withhold our assent to its superior quality.

No. 469. (*h. m.*) The same remarks will apply to the other parcel of blankets, called "bed blankets," from the same manufactory; this is a twilled article, and we think *equal to the best English blankets.* We

have again to express our regret that there was no competition for the premium offered for this description of goods; and also that there was no exhibition of common point and bed blankets, an article of such general use, and one almost of necessity.

The foregoing are all the articles of woollens which have come under our notice worthy of particular observation, we have bestowed upon them that careful attention and examination which their merits severally deserved and required; the impartial result of which we have now laid before you.*

THOMAS ROBINS,
JOHN SITER,
W. WURTS,
JAMES BOGGS.

Extracts from the Report of the Judges on Silks and Lace.

The committee on silks and lace, report:

That they have examined the several lots, or parcels, of silk, included in the late exhibition, and present the following as their judgment in regard to the object of their appointment.

The committee cannot refrain from expressing their deep regret at the limited display of silk which has been made; the more so, as not a single lot comes within the list of premiums.

The specimens of manufactured goods deposited by J. Ripka, and the several lots of thrown silk represented by the Nos. 447 a 449, inclusive, also deposited by him, are deserving of particular notice. The piece of black plush, (No. 146, *h. m.*) which it is believed is made of American silk, is a beautiful manufacture, and superior to the piece of drab, (No. 361,) made out of imported silk. Of all the articles to which the attention of the committee was drawn in the discharge of their duty, this piece of goods seemed to claim a preference; whether the quality of the silk, the excellence of the manufacture, or the colouring, &c. was considered, there was found ample cause to applaud the hand that had been so successfully employed in producing an article which might well compare with most, if not all, that the committee has seen of European manufacture.

In relation to the silk prepared for weaving, alluded to in the preceding, the committee are not so well acquainted with the nature of silk in that state as to speak of it in the same confident manner.

The sewing silk and riband, Nos. 59 and 60, which are represented to have been manufactured at the Shaker village, in Mercer county, Ky. are very good. The former is an excellent texture, well coloured, and possessing a fine lustre. It is decidedly the best specimen of the kind that we have yet seen exhibited. The piece of riband is also

* Col. Jno. E. Colhoun, of Pendleton, S. C., sent two blankets made at the manufactory lately established by him on his plantation; they were delayed at sea, and not received till the last day of the Exhibition; but having been examined, after this report was drawn up, were found worthy of receiving a silver medal. Those blankets have a cotton warp and a woollen filling.

the best that we have ever seen of American manufacture. Lot 57 is deficient in quality and colour. Lot 363, also of sewing silk, is a good colour, but uneven texture, and not strong.

Lot 330, piece of black silk vesting, is made from imported silk, the quality is fair. Lot 275, samples of silk hose, are good quality, but made from imported silk.

The other articles do not claim special attention, excepting the cocoons, and the committee can only add their expression of pleasure in seeing so interesting an evidence of the adaptation of our country to the culture of the mulberry and raising of the silk worm. The committee have been much gratified in viewing the parcel of cocoons deposited by Mr. Duponceau, and which were produced upon the farm of the Hon. H. Bry, Monroe, Louisiana.

The cocoons from worms fed on the new species of Mulberry, which were received from Mrs. Parmentier, Brooklyn, L. I. are very fine; the silk is of good texture and soft.

Lot 58. One box cocoons from worms fed on native mulberry, from Mrs. Dinsmore, Cincinatti, Ohio. The cocoons are hard and firm, but the silk is not so fine and soft as the other specimens.

No lace goods being exhibited, the committee have nothing to say respecting that part of their commission.

Respectfully,

CALEB COPE,
R. COLHOUN SEE.

Extracts from the Report of the Judges on Hardware.

The committee of judges on hardware respectfully report:—

That they have attended to the duties assigned them, and now offer to the consideration of the managers their observations upon the various articles belonging to their department.

No. 1. *P.* The handsome specimens of Britannia ware from the Taunton works, are well worthy of particular attention; the quantity exhibited, and the workmanship of the article, together with its silvery appearance, display in bold relief, its near approach to the more costly metal.

No. 44. An iron candlestick, a good substantial article, will compare with the English both in quality and price.

No. 68, is a number of sad irons, from Arnold & Bacon, Rhode Island; these are good wares, possessing in a great degree the qualities which have distinguished the celebrated Colebrookdale Company's English irons.

No. 69. The cast iron vices were noticed in the last report; it was then remarked that trial alone would enable us to come to a proper conclusion as respects their being merchantable; sufficient time has not elapsed to make them generally known.

No. 70. Specimen of wire appears of a good quality, but as the quantity is small, being about two pounds, and as two hundred pounds

are required to be exhibited to obtain the premium, it must be passed by without further notice.

There are several specimens of japanned ware, which though exhibiting the fact of an ability to manufacture this description of goods to a great extent, still lack the fine finish of the English article.

The edge tools from Springfield, Massachusetts, are certainly goods of a very superior make and finish, and though the maker has to obtain for them a high price, we understand he is not enabled to supply the demand. Dunlap, Madeira & Co. have exhibited samples of their edge tools, which, though not entering into a comparison with the Springfield goods as respects fineness of finish, are a very merchantable article, and we have reason to believe them to be of a good quality. The locks made by Day & Shawk, (*h. m.*) and by M. Kates, (*h. m.*) have been noticed in a former report; but the year which has passed has given to some of the committee an opportunity of testing their quality in the using; they have established an incontestible evidence of their superiority over any other kind of lock ever imported into the country. There is, however, room for improvement in the lackering. The screws from Phillipsburg are merchantable goods, but have not yet established such a reputation as to fully compete with the English. The samples of bell metal kettles exhibited show that the article can be made, but a great improvement must take place in the weight as well as finish, before it takes the place of the English article. The planes display good workmanship and improvement over those formerly exhibited, but the irons being English, it cannot be called exclusively an American article. In approaching the button department, your committee cannot but express the pleasure derived from viewing the beauty and variety of specimens exhibited by the enterprising and spirited makers, J. M. L. & W. H. Scovill, (*h. m.*) and Robinson, Jones & Co. (*h. m.*) This department fully exhibits the power and force of American industry when properly protected; they have almost wholly excluded the English article from the market, making a home market for the consumption of a part of the most valuable of metals.* As it is, we believe them to be unrivalled in all the qualities which constitute a manufactured article, and too much praise cannot be bestowed upon the goods as exhibited by the above named makers. Your committee cannot think of eulogizing one in particular when so much is justly due to the other; they therefore submit to your consideration the propriety of your particularly noticing both. The few samples of pearl buttons exhibited are good articles, and would compare with the English in quality. There were a number of other articles exhibited in this department, such as saws, shovels and tongs, &c. &c. but as they have been noticed before, your committee deem it unnecessary for them to say more, than that such improvement is evidenced, as must ever be the case in a happy country. In closing this report, your committee must express their gratification at the handsome manner in which the

* The great improvement within the last year has given them the most permanent footing.

enterprising manufacturers in this department have stepped forth to enrich the seventh exhibition of the Franklin Institute.

Respectfully,

JNO. GOODMAN, THOMAS C. PRICE,
GEO. HANDY, GEO. ABBOTT.
ALLEN R. REEVES,

Report of the Judges on Philosophical Apparatus.

The committee on philosophical apparatus report, that they have examined the different articles submitted to them. They regret that no article competing for either of the premiums for mathematical and philosophical instruments, was offered. They were struck, however, with the beauty of execution of a self-registering thermometer, (for heat) made and deposited by J. Fisher, (*h. m.*) of Philadelphia. A surveying instrument, by W. J. Young, also attracted attention for its general usefulness and neatness of workmanship.

The committee would respectfully suggest as a matter of record, the providing a premium for accurately made thermometers, self-registering, as well as those of the ordinary kind, suitable for meteorological observations.

HARTMAN BACHE,
A. D. BACHE,
Philadelphia, October 6, 1831. JOS. ROBERTS, JR.

Supplementary Report from the same.

The committee on philosophical apparatus beg leave to make the further report, that among the articles coming within their province, was one not placed at the exhibition until after their first report. The article referred to is a balance of the most delicate kind used by apothecaries, made by J. Marshall, (*h. m.*) of this city. The nicety of performance of this instrument, and the thorough neatness of its parts, render it highly worthy of notice. It has, when loaded with an ounce avoirdupois, proved, in the hands of the committee, to be sensible to less than the one-fiftieth part of a grain. The beam of this balance is eight inches in length, and of brass, the suspension knife-edge playing upon a concave curve of steel: the suspension of the scale hooks also knife-edge, the hooks being of steel. The scale chains, and uniting hooks, are of silver. The index is above the axis of the beam, and the adjustment made visible by the coincidence of the point of the index with a brass stem fixed above it. The stand of the balance is brass.

In recommending this instrument to notice, the committee would suggest the propriety of offering such encouragement to the manufacturers of balances of this sort, as well as of the more delicate kind for philosophical purposes, at a future exhibition, as shall tend to cherish this useful branch of manufacture.

HARTMAN BACHE,
Philadelphia, October 11, 1831. A. D. BACHE.

Extract from the Report of the Judges on Stoves and Grates.

The committee of judges upon stoves and grates beg leave respectfully to report, that they have paid great attention to the important and interesting duty assigned to them, having witnessed the daily trial of such of the coal stoves adapted to culinary purposes, as the makers or depositors were desirous of exhibiting in actual operation.

Nos. 13 and 14. Two sheet iron cooking stoves, made by Mr. Estlin, were found to bake well; they require a small quantity of fuel, and are well adapted to warming the apartment, but are not considered durable, or convenient for boiling or washing.

No. 206. A sheet iron cooking stove deposited by Mr. Lange, is considered excellent, for baking cakes and pastry.

No. 383. A cooking stove, made by Mr. Steinhauer, is considered very economical, and is much liked by a number of families who have used it.

No. 463. A small cooking stove, deposited by Messrs. Steinhauer & Kisterbock, is considered the most economical and convenient apparatus hitherto presented to the public at a low price, and one by which the poor may take advantage of the safety and economy of using anthracite, heretofore almost exclusively confined to the rich. This apparatus costs about six dollars, it bakes and boils well, is convenient for washing and ironing clothes, and is well adapted to warming the apartment. One ton of fine coal, costing three dollars, will supply it with fuel for four months, using it fourteen hours each day. The committee respectfully recommend that a silver medal be awarded to the inventors for the above apparatus.*

No. 19. A cooking stove made by Mr. J. J. Hess, deserves great commendation for the compactness and number of its culinary fixtures. The oven baked well, but very slowly, and the quantity of fuel consumed appeared to be too large. The boiler for washing is too small for ordinary families.

No. 205. A cast iron cooking stove made by Mr. A. A. Young, is very neat and compact, and will be durable, but it is objectionable from the arrangement of the grate, allowing, (without considerable care,) the products of combustion to enter the room. This stove has two ovens, and the ordinary kettles of a family are intended to be used upon it for boiling, &c.

No. 534, *P.* A cast iron cooking stove, made by Mr. Stackhouse, is very neat and compact, and will be very durable. It bakes and boils well, and the whole arrangement is good. The fixtures are

* The committee on premiums and exhibitions, after maturely considering this subject, determined to recommend to the Board of Managers in no manner to sanction any stove or grate, in which the fumes of the fuel should come into contact with the victuals intended to be cooked; their recommendation was adopted by the Board. This explanation is given in order to account for the withholding of the silver medal, and with a view to prevent the inference from being drawn, that the Managers had changed their views on this subject; as at present advised they think it proper to adhere to their former decision, in no manner to lend their sanction to stoves or grates constructed on that plan.

well made, and consist of a large tin boiler for washing, a tin boiler and steamer for meat and vegetables, and a tin tea kettle, to all of which *copper* tubes are attached, which pass through orifices made in the sides and back of the stove, over the fire, and from which an abundance of heat is communicated to the contents of the several vessels. Under the grate is a convenient permanent sifter, to separate the ashes from the coal. The stove, now exhibited, weighs 2 cwt. 2 qrs. 8 lbs; the price twelve dollars, and with the fixtures eighteen dollars; but Mr. Stackhouse has offered to furnish them weighing 1 cwt. 2 qrs. 0 lbs. with the fixtures as above for fifteen dollars, and the committee being informed that the latter will be as heavy, and consequently as durable, as the cast iron stoves ordinarily used, they are of opinion that this stove combines greater advantages than any other now in use, and although the price is not "under fifteen dollars," yet they respectfully recommend that the premium of one hundred dollars, and a silver medal, be awarded to Mr. Stackhouse for the same.*

The committee remark generally, that all the grates of stoves should be adapted to the burning of *small* coal.

The soap stone grates made by Mr. Bingham and Mr. Peck, are considered very neat.

No improvement is visible in the coal grates, since the last exhibition.

MARCUS BULL,
MOSES KEMPTON,
JOHN U. FRALEY,
JNO. MINGLE.

Philadelphia, October 10, 1831.

Extracts from the Report of the Judges on Carpets.

The committee on carpeting beg leave to say, that they consider the Brussels carpeting, No. 21, (*P.*) manufactured at Carlisle, by Mr. Givan, entitled to the premium, being a handsome and durable article, and entirely of *American manufacture and materials.*

* Mr. Stackhouse says—

I engage to furnish, if ordered, fifty coal stoves, weight 2 cwt. 0 qrs. 8 lbs., of the kind exhibited at the late exhibition of the Franklin Institute, without kettles for - - - - - - - - $12 00

And one kettle with a copper tube, and boiler and steamer, - 3 00

One wash boiler with copper tube, - - - - 2 50

$17 50

Allow me to reduce the weight (48 lbs.) of stove to 1 cwt. 2 qrs. 0 lbs., deduct - - - - - - - 2 50

$15 00

Allow me to substitute iron boilers of the same capacity with any of the others exhibited, and the price will be reduced to - $14 50

The ingrain, No. 20, manufactured at Carlisle by Mr. Givan, and that manufactured by the Lowell Company, No. 5, (*P.*) we would leave to your decision, remarking that we consider the Lowell of *superior manufacture*, though not exclusively American, (the warp having been imported in the grease,) and we should not hesitate to recommend it for the premium, if it had been entirely American. The Carlisle is entirely American, and of an excellent quality.

The Brussels, No. 6, manufactured by the Lowell Company, we consider a splendid article, the colours and manufacture being equal to English, and we should have considered it entitled to the premium, if it had been exclusively of American materials.

(*H. m.*) We take pleasure in recommending to your notice the beautiful piece of *painted floor cloth*, manufactured by Mr. Isaac Macauley, of this city, which we think equal in durability and beauty to the English. The oil cloths for table covers, also manufactured by Mr. Macauley, we consider superior to any imported of the same kind of goods.

(*H. m.*) Wm. Christie and Lloyd Mifflin would also recommend to your notice, the tufted hearth rugs, No. 37, manufactured by Doggett, Farnsworth & Co. which they consider much superior to any of the same kind they have ever seen of American manufacture, both for durability and workmanship.

WM. CHRISTIE,
L. MIFFLIN,
JACOB FARNSWORTH,
} *Committee on Carpetings.*

October 7, 1831.

Explosions of Steam Boilers.

Continued from p. 30.

(No. XXII.)

WITH A COPPERPLATE.

To the Committee on the Explosions of the Boilers of Steam Engines.

GENTLEMEN,—Believing that the greater number of explosions which take place in the boilers of steam engines, are occasioned by suffering the water to get too low in them, thereby leaving the sides and flue exposed to the action of the fire, and heating them and the steam to an unwarrantable degree, I take the liberty, (without assigning any philosophical reasons,) to offer the following arrangements for your consideration.

1st, To regulate the quantity or height of water in the boilers at all times, whether the engine is in motion or not.

2nd. To regulate the pressure of steam in the boiler, or to prevent a greater increase of power than is required.

3d. To detect the incorrectness of the safety valve, and the negligence of the engineer; also to give notice should any thing be wrong in the boilers.

4th. To indicate the temperature or relative heat in the boiler.

5th. To enable the engineer to clean the boilers, in a great degree, at any time, without the necessity of stopping the engine.

6th. To prevent the water from flowing from that boiler which becomes the highest, in consequence of the boat being careened, or out of level.

7th. To scrape or remove obstructions in the supply pipes, while the engine is at work.

Description of the Plate.

1st. To regulate the quantity of water.—A, is a small reservoir containing mercury. B, is a small cylinder attached to A, in which is a piston. C, is a part of the flue E, so arranged as to admit the fire to act on the bottom of A; the operation then will be that as the water settles, the top of A becomes uncovered by water, consequently the heat is not carried off so fast, and the expanding mercury forces up the piston and gives motion to lever D; which, by its connexions, as shown by the drawing, raises the stop stem F, which allows the valve G to rise, and admits the water into the forcing pump H; the motions are reversed when the water arrives at the proper height, as shown by the line I; by covering A, the temperature of the mercury is reduced, so that the piston descends, which causes the stop stem F, to approach nearer to the valve G, so as to prevent the valve from rising higher than necessary to admit a regular supply of water. J, is a weight placed on the stem of the valve K, so that the engineer can at all times tell when the pump is in working order, by the motion of the weight up and down, for should any thing be the matter with the pump, the weight will be stationary.

2nd. To regulate the pressure of steam, &c.—L is the common safety valve loaded to the pressure desired; the steam being at that height, the mercury is poured into the reservoir A, until it rises to the proper height, as, for instance, to about the position in which the piston is placed in the drawing; the operation then will be, should the safety valve be overloaded by carelessness, designedly, or accidentally prevented from working, the mercury will rise by the increasing heat of the increased pressure of steam, as well as if the water had been below the top of reservoir A. By the raising of the piston, the end of the lever D is made to press against the spring attached to the lever M, until it bears hard against the end of M, when the valve in N will open quickly and wide, and let the steam on to the small engine O, which is made to work the cold water pump P, to force the water into the boiler through the pipe Q; the cold water reduces the temperature of the water and steam in the boiler, until they come down to the pressure required, when the small engine will stop. To insure the starting of the engine without the assistance of the engineer, it will be necessary to load the fly wheel R, so that the crank will always stop in a proper position for starting. It would be probably better to have two small cylinders, with the cranks placed at right angles, there would then be no doubt that the engine would start as soon as the valve N were opened. From the foregoing explanation, you will perceive that the small engine will

keep the water to the proper height when the boat is stopped; the cylinder B, is intended to give notice should any thing be wrong in the boiler, whether the steam be too high, or the water too low.

3d. To indicate the temperature in the boiler, the brass plate S is graduated so that, by the position of the index T, you can see the relative heat in the boiler.

4th. To enable the engineer to clean the boilers and fill them.—It is well known that where there are heaters attached to the bottom of boilers, that all the dirt and sediment collects in them. It is also well known that those heaters burn out first, owing to the sediment being collected in them and acting as a nonconductor of heat. I therefore propose placing a cross receiver for dirt and sediment connected with the boilers, as shown by the drawing, at U, so that the fire will not act on it; there will be little or no heat lost, as it will not descend. The reason why the sediment collects in those receivers, I conceive to be owing to a continual current in the water from the fire end to the back end of the boiler, and more particularly when the supply is going on; the water at the fire end being lighter, in consequence of the greater heat, rises to allow the heavier or colder water coming from the back end of the boiler, producing a current, as represented by ⇒ in the drawing, allowing the dirt, &c. to pass down the pipe connecting the boiler and receiver; there should not be more than two boilers connected to a receiver when placed in a boat, otherwise we would have no advantage in placing the supply pipes as shown in Fig 2. V, is a cock placed in the end of receiver U, by opening which the dirt, &c. will be forced through a pipe, leading to the outside of the boat under water, which can be done as frequently as you wish. Should you wish to empty your boilers entirely and refill them, the engineer will first put out the fire, leave the doors open to cool down the furnace; then, before the steam gets down, open the cock V, and let all the water out; then by forcing a small quantity of cold water into the boiler, the steam beginning to condense, the water will rush back through the pipes and fill the boilers as high as necessary, when the cock should be shut.

Fig 2.

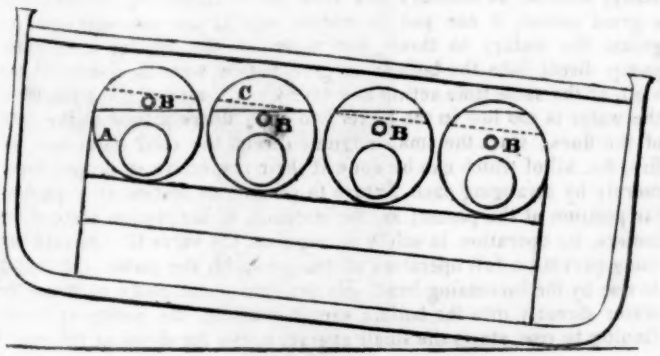
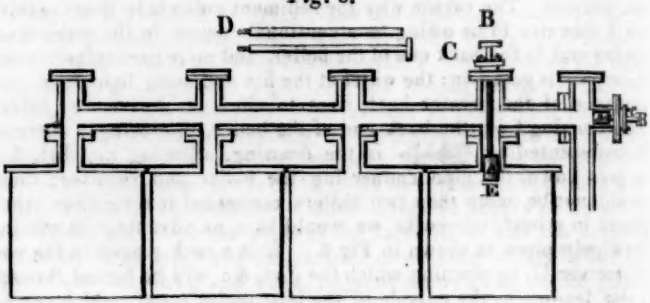


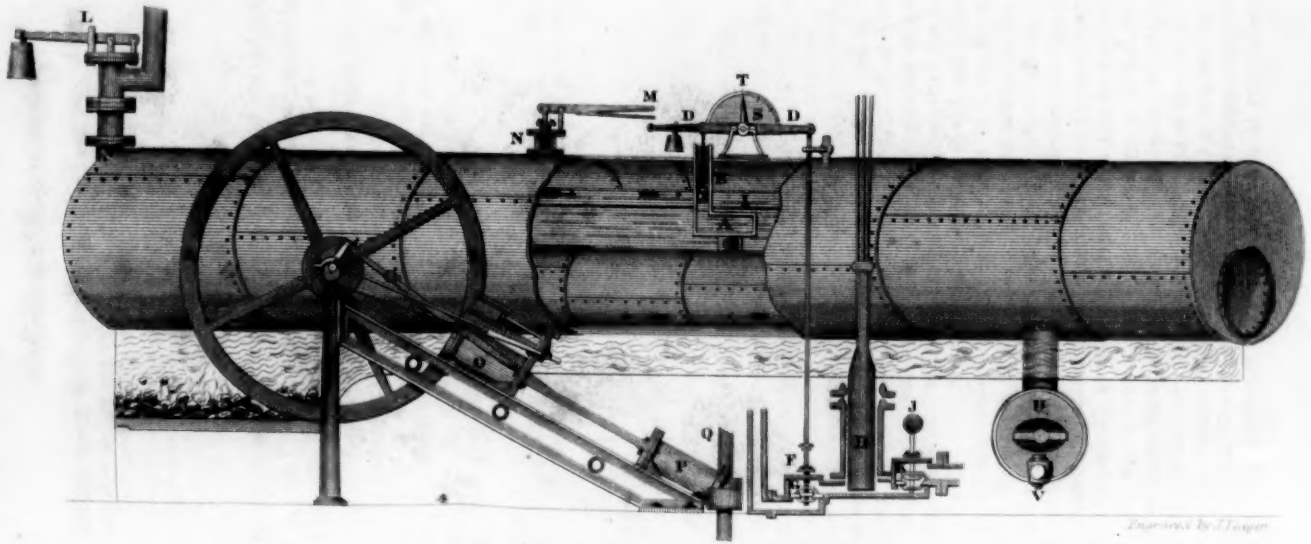
Fig. 2. To prevent the water from flowing from the higher boilers to the lower ones. A, the end view of the boilers. B, the ends of the supply pipes, placed within three inches of the surface of the water, as represented by the dotted line C, which is the position when the boilers are level. The black lines show the position of the water as relates to the boiler when the boat is careened. You will perceive that it is impossible for the water to flow below the bottom of B, let the boat be ever so much careened, or out of level. The drawing shows the pipes without valves on the ends, which would be necessary to prevent any water from flowing back; they should have hinge valves such as represented in the margin. To clean the supply pipes they should be arranged as represented in Fig. 3.

Fig. 3.



A, is a small cylinder made of sheet iron, about a quarter of an inch thick, with the ends somewhat sharpened, fastened to the stem B, working through a stuffing box, as at C. D, are connexions for screwing on the end of B. A, being forced backwards and forwards, scrapes the side of the pipe entirely clean. At E is a scraper of the same kind as that placed at the end of each boiler.

The advantages of making use of the mercurial apparatus are many, because as mercury is a fluid metal expanding by heat with a great power, it can put in motion any fixture necessary to regulate the water; to throw the water of the regular cold water pump direct into the boiler; to give notice when the steam is too high, at the same time acting as a safety valve, also to warn you when the water is too low in the boiler; to open doors placed at the ends of the flues; start the small engine; direct the cold water into the fire, &c. all of which can be done at their respective or proper times, merely by arranging each fixture to receive its motion at a particular position of the piston; as, for instance, in the regular state of the boilers, its operation is solely to regulate the valve G. Should any thing prevent a full operation of the pump H, the piston continuing to rise by the increasing heat, sets the cold water pump to throw the water directly into the boiler; should that fail, the piston still continuing to rise, starts the small engine, opens the doors at the end of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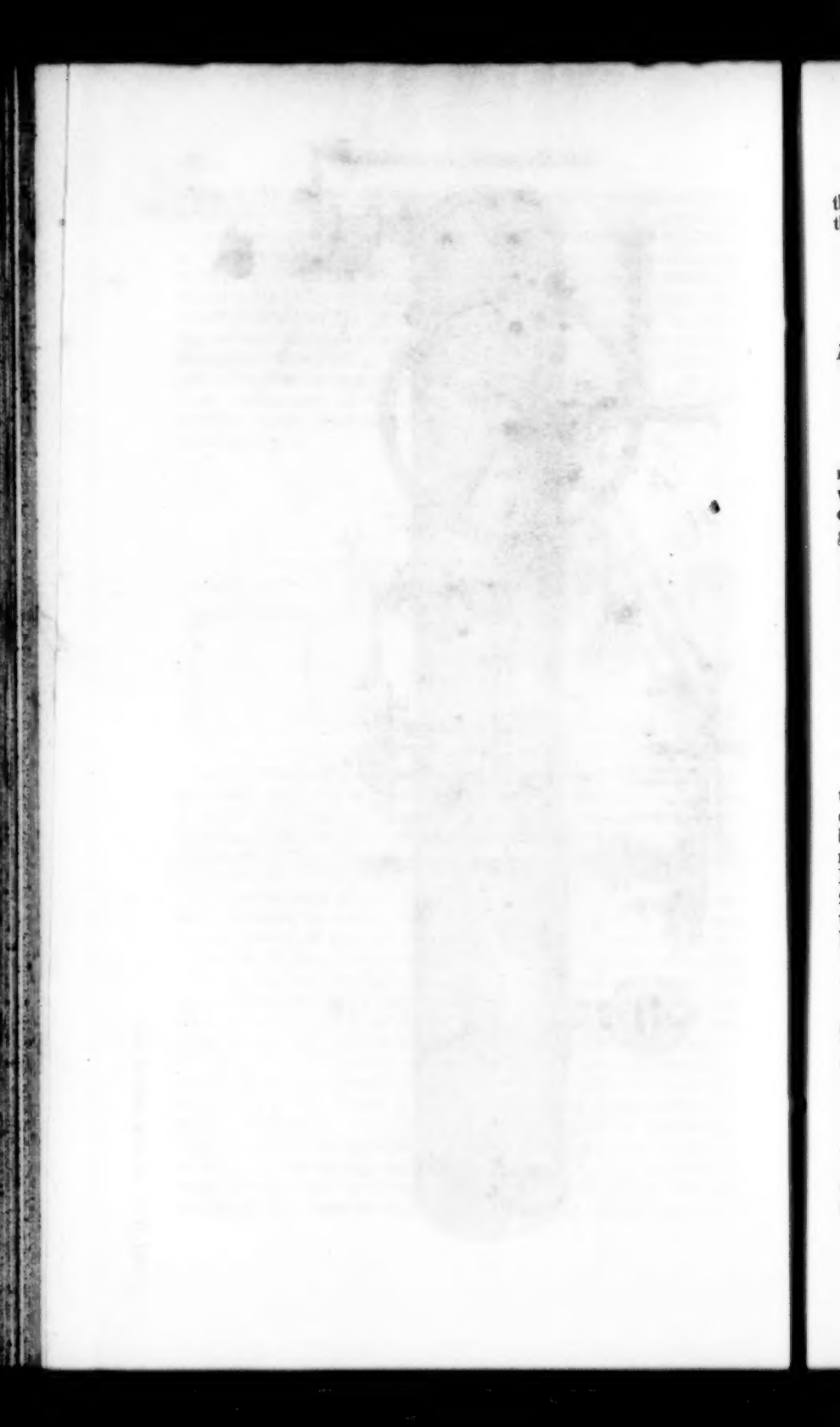


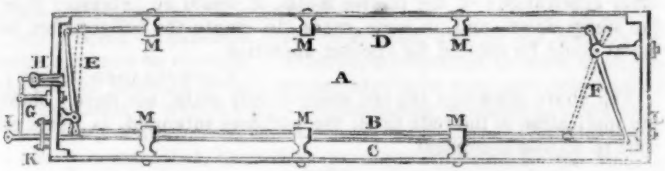
the flues, opens the cock to give notice, and changes the direction of the water to put out the fire.

Yours, respectfully,
CADWALLADER EVANS.

Further observations for the consideration of the Members composing the Committee on the explosion of steam engine boilers, of the Franklin Institute.

Fig. 1. Expanding rods to prevent the explosion of steam boilers. A, a ground view of a steam engine boiler. B, C, D, are brass rods of about three-fourths of an inch in diameter. E and F are levers connected to the brass rods. G, a lever attached to the valve cock H. K, a stuffing box at the end of the boiler. M, M, are guides to prevent the rods from bending.

Fig. 1.



Explanation of the principle and operation of the rods.

Smeaton, in his experiments on the expansion of metals, has found that 180 degrees of heat, will expand iron one foot in length $\frac{151}{10000}$ of an inch, and that brass expands $\frac{232}{10000}$ of an inch. Suppose the boiler to have been 20 feet in length, and the rods 18 feet: we will now suppose that rod B is secured to the back end of the boiler at L, then 232, expansion of one foot of brass, $\times$ 18 = 4176 — 151 $\times$ 20 feet length of boiler = 3020 = 1156. Expansion of rod B beyond that of the boiler, which $\times$ 13, the ratio of length of the arms of lever E, = 15028 + 4176 = 19204 the motion of the end of rod D, which $\times$ by 12, the ratio in length of the arms of lever F, = 230448 + 4176. Expansion of rod C, = 234624, the motion of the end of rod C at 1, which $\div$ by 10,000 = $23\frac{4624}{10000}$ inches. Now, as 180 degrees : 23.4624 : : 10 degrees = $1\frac{3034}{10000}$ inches, so that it appears a very small increase of temperature will give the necessary motion to open the cock H, at the proper time, it can also be applied to regulate the damper, to increase the supply of water, or to direct the water of the cold water pump immediately into the boiler; it is also evident that we are not limited in the motion of the end of the rod C, but can arrange the machine so that one degree will give a motion of three or more inches: when the boilers are made of copper, the rods should be of iron, the motion of the rods would then be reversed by increased heat.

Fig. 2.

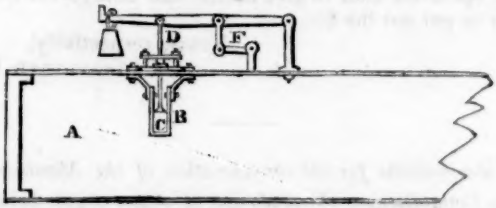


Fig. 2, represents an improved application of the fusible metal for the purpose of giving the alarm when the water gets too low in the boiler. A, the boiler. B, a small cylindrical tube. C, the fusible metal. D, a stem passing through a stuffing box, and resting on the fusible metal, the other end fastened to lever E. F, an alarm cock which opens when the rod D descends in the fluid metal, and gives notice that the water is too low. What I consider to be an improvement is the use of the cylinder, which prevents the metal from being lost, and is always ready for a new operation. I believe in all other applications of the fusible metal, it would be necessary to get the steam down, and, in some cases, to empty the boiler before the metal could be applied for another operation.

CADWALLADER EVANS.

The above drawings are not made to any scale, nor have I shown the application of the rods to all the purposes intended, as I have not time to do this at present.

(No. XXIII.)

Letter from John G. Cassedy, dated

Washington City, October 4th, 1830.

GENTLEMEN,—Aware of the magnitude of the subject upon which I intend addressing you, involving the lives and property of the citizens of our country, I will treat the subject as fully as circumstances will allow, paying due regard to that brevity so desirable in communications of this nature.

The repeated and melancholy catastrophes arising from the explosion of steam boilers, have produced in our country a general, and I hope, a beneficial, excitement, causing minute researches and investigations that may ultimately avert such awful and terrible consequences. A moment's reflection upon the recent explosions of the Helen M'Gregor, Chief Justice Marshall, and others, would, were conviction necessary, convince the most obdurate that immediate and prompt measures should be taken to prevent in future such vast sacrifices of life and property, to whatever causes they may be attributable; whether from defects in boilers, ignorance, negligence, or other causes yet unknown, the proper and efficient remedy for which, I humbly pray, may be the result of your philanthropic investigations; which, if aided by the zealous co-operation of Congress, I have not a doubt will be the case, and that in future our lives and property will be secured from such disasters.

The circular published by you, requesting information upon this

important subject received my early attention; but circumstances have, until now, prevented me from addressing you on this subject, and when it is receiving the consideration of the science and experience embraced in the Franklin Institute of Philadelphia, perhaps delicacy ought still to restrain me.

That part of the extensive subject to which I would draw your attention is the construction of the safety valve, it being in its present form, as generally used in this country, considered, and found by experience, highly defective. Against the safety valve now in use there may be urged the following objections, which the improvements I have to propose will entirely obviate.

It admits of being loaded to any extent, thereby increasing the density of the steam to any indefinite pressure, without the slightest knowledge being given to, or attainable by, any of the passengers who might take the necessary precautions for their safety. It is sometimes so placed that it can be loaded by any unguarded hand, or passenger, on board the boat; and, lastly, it is at the entire command of the engineer, offering every facility to increase the pressure when ambition or other causes might induce him to hazard the lives of the passengers for the paltry consideration of excelling in speed. I will proceed to examine these objections, stating the manner in which they can be obviated. A boiler, constructed to work upon the high or low pressure system, is regulated in its strength accordingly; each thickness of iron having a corresponding pressure to withstand, which, for a limited time, can be borne with safety. Boilers, when originally constructed, have their pressure regulated by the weight affixed to the safety valve, which, when retained in its original position, produces no more than an ordinary density of steam; though in its construction, (the weight being hung to a horizontal lever, with its fulcrum at the extreme end,) the weight admitting of being removed to the other extreme end, or from the fulcrum; thereby increasing the effect of the weight upon the valve in proportion to the leverage obtained. To exemplify this objection, I will relate an anecdote of a steam-boat captain, in the western waters. A boat had overtaken him; the steam was raised to "blowing off;" he jumped upon the safety valve, and swore he would either "beat her, or else blow up." To men so destitute of the principles of prudence, the life of an unwary passenger should never be intrusted, I therefore would place this safety valve beyond the reach of one so hazardous and imprudent. Any hand, or passenger, on board the boat, unconscious of the dangers that arise, might remove the weight from its proper position to the extreme end of the lever, thereby increasing the pressure perhaps two fold; from any such dangerous removal serious consequences must ensue.

In a momentary excitement, similar to the above instance, the captain, or engineer of the boat, might remove the weight on the lever, regardless at that time of attending dangers; while in an hour of cool deliberation he might shudder at the dangers he had escaped, and wonder at his extreme good fortune.

To obviate these general objections, arising from the dangerous alterations to which this valve is susceptible, I will explain the

construction of the valves possessing these qualities. For boilers working upon the low pressure system, where steam much above one atmosphere is impracticable, I would have a chamber, A, A, Fig. 1, having at the bottom a seat for the reception of the valve B, (as constructed upon the ordinary principle;) the requisite load or weight c, should be cast upon this valve, fitting close into the chamber A, A, with an intermediate space only sufficient for the action of the valve; there being grooves cast upwards in the load c, as channels for the steam to escape when the valve is raised; when from the filling of the chamber with the weight or load c it is impossible to increase the weight within the chamber A, A. To prevent any weight being hung to the vertical valve rod, (as done on some occasions,) we would dispense with this rod, and substitute a chain, D, which chain, while answering all the purposes of a rod in raising the valve, will allow no additional application of weight, for a chain bearing a strain equal to its strength, will not withstand the least pressure without coiling; as would be the case with the chain D, in an attempt to load by the outward lever. The weight c is hollow, the chain D, being attached to the top of the valve. By this simple contrivance of enclosing the weight immediately upon the safety valve in a close chamber, and of having it raised by a chain, coiling the moment any pressure is applied, all stratagems of an imprudent and hazardous engineer are put at defiance; or when through ignorance he may be unconscious of the dangers he is hazarding by an increase of pressure on the valve: as thus contrived it is utterly impossible.

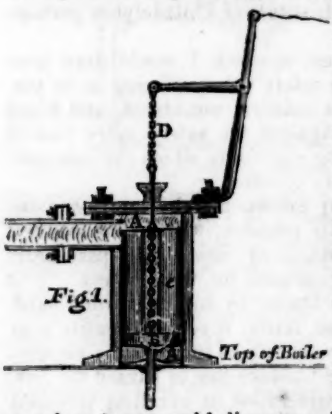


Fig 1.

Another construction of the safety valve, similar in its principles and advantages, is, like Fig. 1, adapted principally to low pressure boilers.

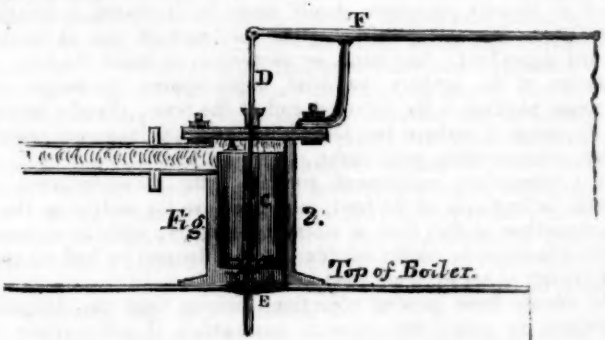


Fig. 2.

The valve B, Fig. 2, is loaded like Fig. 1, with a small hole drilled vertically through the weight C and the valve B, with a valve seat at the bottom for the reception of the small valve E, into which it works, closing upwards. When an attempt to load is made by suspending a weight to either end of the lever F, both applications are found to allow the steam to escape; for by hanging it to the short arm you depress the valve E, it opens, and the steam escapes; or if hung to the long arm, it raises the small valve, which closes and presses upwards against the large valve B, which lightens or even raises it, allowing the steam to escape. The small valve opens downwards, the large valve upwards.

From the greater weight required upon the safety valve of a high pressure boiler, it would be impracticable to load the valve upon this principle, having to extend the chamber to a considerable height or width. To prevent this, the chamber should be perfectly close, as heretofore, leaving no space for an addition of weight, with the guide extended to some convenient length downwards, as in Fig. 3, with a joint below to be attached to the lever E, having its fulcrum at the extreme end, F, with a lead weight, D, cast upon the other extreme end of the lever E. By this leverage of the weight, (supposing it to be quadruple,) the effect of the weight upon the valve will be quadrupled, one hundred pounds acting with a pressure of four hundred pounds in virtue of the leverage obtained.

To prevent the lever E, and weight D, from receiving a swagging motion from that of the boat, it can be admitted into a groove stauncheon, G, secured to the top of the boiler, extending downwards; this groove of a length only to allow a sufficient rise of the valve A for "blowing off."

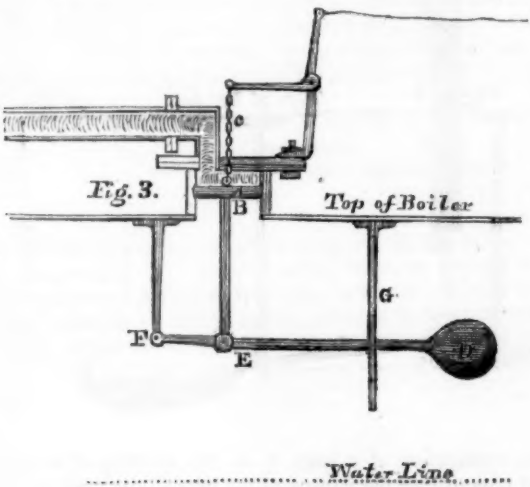
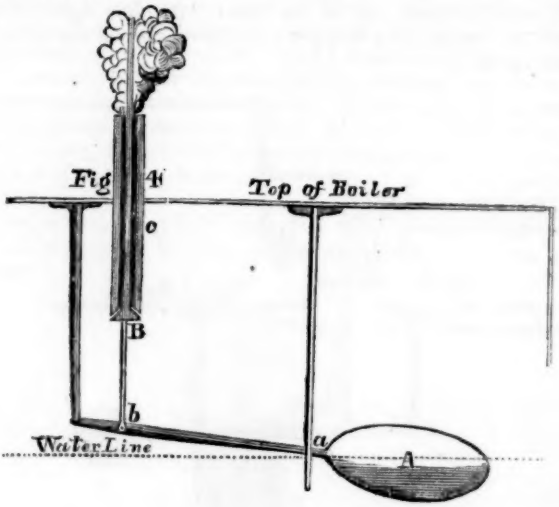


Fig. 3.

This construction of a safety valve, (intended for high pressures,) though not presenting a total impossibility of an increase of weight, still presents difficulties which are not easily overcome; nor could the slightest addition be made to the weight, for one or two days, required for the boiler to cool before any person could venture in it to make the alteration, which trouble and delay it is supposed few will take when engaged in regular trips with passengers or freight, thus preventing entirely any sudden increase of weight which a momentary excitement might prompt the captain or engineer of a boat to make, and which upon mature deliberation would be censurable even in themselves.

Scarcity of water in the boilers of a steam engine, causing in a great measure the most awful and fatal explosions, of late rendering a passage in a steamer a voyage of fear and apprehension, may be well attributed to the inattention of some of our engineers to a most necessary part of their duty, namely, that of keeping a proper supply of water in their boiler.

Every boiler is supplied with two or more gauge cocks, for the purpose of ascertaining the height of water within it. With sufficient attention paid to these, other contrivances would be superfluous; but experience in many instances has taught that other contrivances are necessary, compelling an engineer to pay sufficient attention to his gauge cocks. A plan of one I will endeavour to explain. (See Fig. 4.)



It is the application of a float, A, to the working of a valve, B, fitted and ground into the bottom of the pipe C, secured to the boiler; the valve having a guide extending through the pipe, with the

other necessary levers for its operation. When the water is at its proper height, the buoyancy of the float A, will close, and keep closed, the valve B, which is perfectly steam tight, but in the event of the water lowering to a dangerous point, the float A, by its own gravity, will descend with it, acting with the leverage *a*, *b*, brings with it, and opens the valve B, thereby allowing the steam to escape through the pipe *c*. The lever of the float A is steadied by a grooved stauncheon, as described in Fig. 3.

A negligent engineer will thus receive an effective warning of his danger, demanding immediate and prompt attendance to a renewal of the requisite quantity of water, as the only means to prevent the steam from escaping.

These contrivances, if generally adopted, might afford security against a dangerous pressure of steam; if obtained by these or any other contrivances that your experience and science may recommend, I will receive sufficient remuneration for my trouble.

Gentlemen—Before quitting this subject, which has been so deeply impressed upon you and the majority of our citizens, allow me to pay a passing tribute of respect and gratitude, due from our country to your indefatigable zeal and labours in so humane a cause: the deep interest you have taken in this momentous subject, and the ability with which such a scientific investigation must be continued by you, will no doubt prove successful in preventing further sacrifices of our fellow citizens. For your unremitting exertions for the attainment of these desirable ends, you will call forth the thanks of our travellers, our citizens, and our country, whose safety and welfare you have made your study, and whose gratitude, which you merit, shall be continued as long as the beneficial results of your labours shall be experienced and admired.

Allow me, gentlemen, to conclude by offering an apology for this humble tribute which love of country has induced me to offer; should you think it worthy of perusal, my gratitude will be increasing and continual, while the suggestions of the humble may be thought worthy of consideration.

I have the honour to be,
Gentlemen,
Your obedient servant,
JOHN G. CASSEDY.

In writing this communication upon the safety valve, two of my own construction only were included, when by request of a gentleman of science, I included two of his, to whom the merit of the original idea belongs, he having called upon me to furnish drawings, &c. by which circumstance my attention was first drawn to the subject.

(No. XXIV.)

Extract of a letter from James D. Woodside, dated

Washington City, August 22, 1830.

Sir,—By an advertisement in a paper of this city, I perceive that it is the wish of the Franklin Institute to receive from individuals their ideas in relation to the bursting of boilers on board of steamboats, and if practicable to devise some plan to prevent it. I therefore do myself the pleasure to remark, that, in my opinion, though the causes of explosions are many, yet there are two which may be considered as the principal ones.

The first I shall name is defect in the metal, and the second permitting the water to get too low in the boiler. The water in the boiler should never be permitted to fall below a certain line. About three years since I devised a plan for preventing boilers from bursting, by having a safety valve within the boiler, where no one can possibly meddle with it, and so constructed as to open itself when the water has fallen to a certain depth. This valve will certainly open of itself when the water has fallen below it.

There might be a great improvement made in boilers which would very materially strengthen their ends, viz. by having them convex within, and, of course, concave without. Added to this, let bars of wrought iron be placed across the ends of the boiler, say three bars making ends to overlap the edge and support the rivets all round.

In the present mode, safety valves are placed where additional weights may be applied to keep them closed; this in a race has been the cause no doubt of many disasters. I remember to have noticed a paragraph in a Baltimore paper giving an account of the explosion of a boiler, caused by the captain's adding his weight to the lever for closing the valve, which caused the boiler to burst, and did considerable injury.

* * * * * *

Very respectfully yours,

James D. Woodside.

(No. XXV.)

Letter from E. Bigelow, dated

Washington City, September 23, 1830.

Sir,—I believe that I have found a means by which explosions may be prevented. Though there may be many causes of these accidents, I believe a deficiency of water in the boiler to be the principal one. I propose to place a pipe upon each boiler, under which is a plate of iron or copper much weaker than the boiler; this plate will give way sooner than any other part of the boiler and allow the steam and water to blow up without damage.

Yours, respectfully,

E. Bigelow.

(No. XXVI.)

Second letter from E. Bigelow, dated

Washington City, September 25, 1830.

Sir,—My first letter not having referred to a method of preventing a collapse of flues within boilers, I write again to propose that moveable braces should be placed within these flues. Such braces should not be made so large as to interfere with the draft, or with facility of removal.

Yours, respectfully,

E. Bigelow.

(No. XXVII.)

Extract of a letter from John D. Weird, of Vergennes, Vermont.

I see that there is much discussion upon the subject of the bursting of steam boilers, and that your Institute is investigating the matter, and as all sorts of opinions appear to be requested, I beg leave to offer mine as the result of no inconsiderable practical experience, although I know it differs from the opinions of nearly all the steam engine builders on this side of the Atlantic, and also from an opinion published by Dr. Jones in your journal, that steam of the elastic force of fourteen or fifteen pounds per square inch may be used with safety. My opinion is, that steam of greater force than three or four pounds per square inch above the pressure of the atmosphere can never be used without great danger, for no ingenuity can render a boiler secure against accidents, therefore security can only be obtained by using steam of such force as shall not produce extensive mischief when accidents do happen. Mr. Burr says,* "we hear of no similar explosions in Great Britain;" the reason is, that all the British "marine engines," as they are called there, are worked with a pressure of only three or four pounds per inch in the boilers, instead of the thirty-six pounds per inch used in many of the American low pressure boats. And it is a fact too that some steam engines, made by Mr. Watt forty years ago, will at this time perform more work, with a given quantity of fuel, than any that have been made since, and they are uniformly worked with the low pressure of four pounds per inch. This circumstance is certainly no argument in favour of using high steam for the sake of economy.

I am, &c.

John D. Weird.

* Jour. Franklin Institute, p. 333, vol. vi.

Franklin Institute Quarterly Meeting.

The thirty-second quarterly, or eighth annual meeting of the Institute, was held at their hall on Thursday, January 19, 1832.

Thomas Fletcher, Vice President, took the chair, and William Hamilton was appointed secretary, *P. T.*

The minutes of the last quarterly meeting, and also the minutes of the meeting held this day at 4 o'clock, to appoint the tellers, and to open the poll for the election of the officers and managers of the Institute for the ensuing year, were read and approved.

The annual report of the Board of Managers was read and accepted, when, on motion, it was referred to the committee on publications, with instructions to publish it.

The annual report of the Treasurer was read and approved.

The amendment of the constitution, proposed at the last quarterly meeting, was called up, when the following amendment was offered, viz.

Article 2nd, section 4th. Any member who shall have refused to pay his annual contribution for two successive years, shall, by a vote of the managers, forfeit his membership; but he shall not thereby be exonerated from the payment of his arrears.

Which, after some discussion, was unanimously adopted.

The tellers appointed to receive the votes of the members, made their report, when the Vice President declared the following gentlemen duly elected Officers and Managers for the ensuing year.

President.....James Ronaldson.

Vice Presidents.....Isaiah Lukens,
Thomas Fletcher.

Recording Sec......J. Henry Bulkley.

Corresponding Sec.....Isaac Hays, M. D.

Treasurer.....Frederick Fraley.

Managers.

1. Samuel V. Merrick,
2. Abrm. Miller,
3. Wm. H. Keating,
4. Adam Ramage,
5. Isaac B. Garrigues,
6. Rufus Tyler,
7. John Struthers,
8. John O'Neill,
9. M. W. Baldwin,
10. Saml. J. Robbins,
11. Mordecai D. Lewis,
12. Chas. H. White,
13. Thos. Scattergood,
14. Benj. Reeves,
15. Alexr. D. Bache,
16. Alexr. Ferguson,
17. Joshua G. Harker,
18. John Agnew,
19. Charles Toppan,
20. Geo. W. Tryon,
21. John Wiegand,
22. William Wetherell,
23. John B. Trevor,
24. William B. Reed.

The committee on statistics reported that they had prosecuted

their preparatory duties almost to completion; the circulars and schedules were all ready for distribution.

On motion, the committee on statistics were instructed to present at the next monthly meeting a list of persons to be nominated to serve as ward committees to collect the information relative to the manufacturing establishments, &c. in the city and districts of Philadelphia.

THOS. FLETCHER, *Vice President.*

WILLIAM HAMILTON, *Rec. Sec. P. T.*

Report of the Board of Managers.

To the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, the Board of Managers respectfully submit their Eighth Annual Report.

THE termination of the eighth year of our labours invites us to a review of the general concerns of the Institute, and of the progress which has been made during that year to promote the great objects for which it was established.

Pursuing the order which was adopted on former occasions, we shall first call the attention of the members to that part of our duties which is connected with education.

This was the first object of the founders of the Institute, and must ever continue to be one of its most important departments. Another year's experience adds to the high opinion previously formed of the general fitness of the plan of instruction heretofore pursued, while the success of some new and hitherto untried projects seems to invite to further experiments in order to add to its usefulness and efficiency. The separation of the subject of practical mechanics from the chair of natural philosophy and mechanics has added to the attractions of our lecture room. The instruction delivered every fortnight by our new lecturer, Mr. Franklin Peale, has from its novelty and from the intrinsic merits of the lecturer, attracted much attention on the part of the public; the experiment, so far as it has proceeded, has given to the Board great satisfaction, and has, it is hoped, been equally gratifying to the members of the Institute at large. By reducing the very extensive field which had fallen to the lot of Professor Johnson, it will relieve him from part of his duties, and enable him to devote more time to other portions of the important professorship committed to him. Natural philosophy may be considered as the very element of all the subjects taught in the Institute's lecture room. Without a proper knowledge of it, the students will derive much less benefit from the lectures on mechanics, or on chemistry. It is therefore desirable that this science should be taught as thoroughly as possible, and that the lecturer's attention and time be not divided between too many subjects. The course of chemistry, by Prof. Franklin Bache, continues to enlist the attention of a large and respectable part of the community.

It is with much pleasure that the Board advert to the increasing interest in our lectures manifested by the females and younger branches of the families of our members. There have been issued by the actuary, 196 minors' tickets, 63 ladies' tickets, and two strangers' tickets. Including female minors, there are now 110 ladies attending our lectures, which is an increase of 44 over our number last year.

Our schools have also experienced some change in their organization, and have, we believe, increased in efficiency. The drawing school retains its usefulness, and includes at present thirty-nine pupils. The teacher of ornamental drawing, Mr. Bridport, having resigned his situation, it has been found expedient not to fill the vacancy during the present winter. The teacher of architectural drawing, Mr. Strickland, is well qualified to give instruction in all the departments, and experience has satisfied us of the propriety of having but one teacher in the same room at the same time. Doubtless, if the funds of the Institute permitted us to retain for our own use some of the apartments which are now rented, a more enlarged plan of schools could be adopted, consistently with the ampler accommodations which would then be at our disposal. Foremost among the departments which would claim a portion of these accommodations, would be the new English school lately opened by the Board. Our predecessors have had frequent opportunities of expressing their sense of the importance of the mathematical school, established soon after the formation of the Institute, and their regret that it did not meet with that encouragement to which it seemed entitled. Believing that its failure proceeded from the circumstance that its plan was too restricted, and not sufficiently popular, the Board have this year established an evening English school; in which all the branches of a plain English education are taught; with this additional circumstance, however, that the high qualifications of the teacher will enable him to carry his pupils as deeply into the science of mathematics as it may be convenient or desirable that any of them should proceed. This school embraces, therefore, all that was expected of the mathematical school, while its more enlarged field of operations will, we hope, give it an additional degree of popularity with the members of our association. The salutary provisions of our laws, as well as the more powerful influence of public opinion, require that each apprentice shall receive from his master, during the term of his apprenticeship, a certain amount of schooling. Unfortunately, however, this part of the indentures is in many cases but imperfectly attended to. It is the object of the Board to establish a school of such a character as shall command the good opinion of our members, and induce that large portion of those who are engaged in mechanical pursuits to select it as the best for the education of their sons, and of the apprentices committed to their charge. To the journeyman, likewise, who wishes to improve himself, it will offer great inducements. Actuated by these views, the Board have selected for the teacher Mr. Seth Smith, and have placed the expenses of the school upon the lowest terms. The committee of instruction have reported to the Board

the entire satisfaction which they experienced from the judicious mode of instruction adopted by Mr. Smith, from the good order and attention which prevail in the school, and from the accommodations which it affords to those who now attend it. It has been open but a few weeks, and the number of pupils in attendance is consequently very limited, but there is reason to hope, that after it shall have been longer in operation, and have become more generally known, it will receive additional patronage, and by its increased numbers, as well as by its merits, reflect credit upon the Institute. To the fostering care and attention of their successors the Board would specially recommend this school, as an instrument calculated to produce great good.

The Board having ascertained in the beginning of the year, that a gentleman of this city was disposed to give a course of lectures on geology, provided sufficient encouragement were given him, granted to him the use of their room, free of rent, or expense of lighting and heating, on condition that corresponding advantages should be extended by him to such of our members as chose to attend the lectures, and it is believed that a number of them availed themselves of the opportunity.

The following schedule exhibits the benefits derived by the community from our system of lectures and schools; premising, however, that it does not include the number of members of the Institute that attend the lectures, but merely the extra tickets sold, during the last and the present winter.

	1830–1	1831–2
Lecture tickets sold for minors, .	175	196
do. do. ladies, . .	42	63
do. do. strangers, .	2	2
	219	261
Drawing school tickets, architectural department,	41	39
do. do. miscellaneous do.	19	suspended.
English evening school, recently established,		23
Aggregate, . . .	279	323

Increase over last year 44.

The next subject to which we would invite your attention, is that of exhibitions. The experience of each succeeding year adds to our conviction that next to education, and second only to that in importance, are the displays of domestic manufactures made at stated periods under the patronage of the Institute. It would carry us too far at present, and indeed it would be a work of supererogation, to enlarge upon the great benefits which the country derives from them; it will suffice to state, that to the Institute itself they are of incalculable advantage—they keep it in close and intimate connexion with the manufacturers and mechanics not only of this city, but of the

Union at large—they quicken the zeal and interest of our fellow citizens in the prosperity of an institution, which, so long as it shall continue to restrict itself to its legitimate field of operation, cannot fail to receive, as it will deserve, extensive patronage—they gratify the just and honourable pride of the mechanic, and induce him properly to estimate the character of the association, which enables him without any expense or trouble to himself, to select in his obscure and remote workshop, the wares which, when exhibited in broad daylight before thousands of his fellow citizens, procure to him the meed of approbation, as well as the more solid benefits resulting from a due appreciation by the consumer of the merits of the manufactures of our own country. To promote these exhibitions, and to secure their success, it is the duty of those whom you have entrusted with the stewardship of your affairs, and who have accepted the trust, to spare no exertions, and to avoid no reasonable expense. Impressed with these views, this Board adopted at their very first meeting the project of holding an exhibition in 1831, and at their first stated meeting, they decided that as no views of mercenary profits influenced the Institute in their establishment, all the proceeds from the sale of tickets of admission, should go to the defraying of the expenses of the exhibition, and that any surplus funds should be appropriated to the improvement of subsequent ones. Accordingly the expenditures of the last exhibition have been upon a more liberal scale than those of any that preceded it. Our Actuary was sent to visit the principal manufacturing towns and establishments in the United States, in order to establish a personal connexion between the proprietors and the Institute. They were invited to send their goods to our exhibitions, the objects and character of which were fully explained to them. Several of them availed themselves of the opportunity of doing so, and others who were not prepared for the exhibition of 1831, have promised to contribute to them in future. The success of that held in October last has fully realized our most sanguine expectations, and is believed to have exceeded in interest any of those which had preceded. It has certainly shown that neither the zeal of our manufacturers, nor the interest of the public, had suffered the least impairment by the frequent repetition of our appeals to them. Influenced by these motives, the Board immediately afterwards considered the propriety of holding the eighth exhibition in October next, and resolved the question affirmatively. Without intending to decide that circumstances may not at some future time require that their recurrence be less frequent, we shall confine ourselves to the statement that hitherto no such necessity has presented itself, and that we are of opinion that it is the duty, as well as the interest of the Institute, however troublesome their exhibitions may be, not to shrink from them so long as they are productive of the benefits which have hitherto attended them. If any further proof be wanted of the estimate in which they are held by the public, we shall find it in the readiness with which the Institute have been intrusted with the appropriation of moneys raised for the advancement of certain branches of industry. The sum of one hundred and twenty

dollars was last year placed at their disposal to encourage a competition on stoves and grates for anthracite; of this fund one hundred dollars have already been awarded. A still more flattering proof of confidence was evidenced in the appropriation by the City Councils of the sum of one hundred dollars, to be awarded by the Institute to the successful competitor on street lamps, in October next.

With a view to do justice to all those who had deposited their wares at our last exhibition, a full account of it has been published in pamphlet form, and is in the course of distribution. To it is annexed the plan of the eighth exhibition, with the list of premiums to be then awarded; the Board would earnestly invite the members to assist in its extensive circulation. Finally, it is gratifying to the Board to state that they have succeeded in obtaining a sufficient number of medals to redeem the pledges given, not only at the last exhibition, but even at the preceding ones, and that a public distribution of them will take place on the 21st instant, and that it will be preceded by an address by a member of the Institute. Those to whom honorary mentions have been awarded, will at the same time receive the certificates which have been prepared for them.

The Journal of the Institute has been continued with every possible attention. The valuable services of our esteemed editor, Dr. Jones, have been secured for a continued period by a new arrangement equally satisfactory to himself and to the Institute, and the difficulties and obstacles produced by his distant residence have been removed by the assiduity of a committee of the Board. The Journal has, during the last year contained more original matter than at any former period. It includes the description of four hundred and seventy-two American patents, with remarks upon their respective merits, and full copies of the specifications, accompanied by plates, were published whenever the importance of the subject warranted it. The patronage which the Journal receives is gradually increasing, though by no means equal to what we would fain hope that it will be after its merits shall be better known and more fully appreciated. It is perhaps not sufficiently known that the Board have, by great exertions, succeeded in making arrangements which enable them to offer a liberal compensation to those authors who contribute communications to the Journal. This arrangement, it is believed, will add much to its merit. The nett increase in the list of subscribers during the last year does not exceed eighty-eight, but it is hoped that by due exertions a larger accession will be obtained.

The Journal has been enriched this year by the publication of meteorological observations; a subject which had been heretofore unattended to, but which in the present state of science should not be neglected. These are interesting, as it is believed that there are very few meteorological tables regularly published at this time in the United States.

The investigations, commenced two years since, on the subject of water power, were carried on with a perseverance and devotion on the part of the committee to which they were entrusted, that entitle the results which they have obtained to the fullest confidence. That

the range of their inquiries was extensive, and the attention bestowed upon each part, minute, will appear from that portion of their report which has been laid before the public. Those who had expressed surprise at the length of time which elapsed, before the commencement of the publication, have ceased to wonder at it, since the extent of their calculations has become manifest. The published part of the report already includes sixty pages, and contains the results of 694 experiments, the effect of each of which has been subjected to minute calculation. The residue will be published with as much rapidity as can be done, consistently with the numerous engagements of the gentlemen who are preparing the report.

The committee charged with the investigation of the causes of explosions in steam boilers, have also been zealous in the pursuit of the subject entrusted to them. An extensive diffusion of their circulars produced an accumulation of reports and communications, some of which contain much instructive and interesting matter. As the curious facts which it embraces seem to deserve immediate publication, a selection was made from the mass, and the publication has been continued for several months; adding, it is believed, to the interest of the Journal. In addition to this, the committee have made experiments upon many of the points which were deemed deserving of particular investigation, and have expended about one-half of the fund which was placed at their disposal for that purpose. It is hoped that the whole of the experiments will be completed in the course of a few months, when their results will be brought before the public.

The Institute have also commenced an investigation of much interest, into the resources of our great commonwealth, considered in relation to its industry and manufactures. It is one of the peculiarities of a country situated as ours is, that the constant increase of its wealth and population, as well as the great fluctuations produced by it, renders the task of collecting statistical information extremely difficult, while at the same time it becomes the more important. With a view to contribute their aid in this respect, and disavowing all considerations not strictly scientific, the Institute have raised a committee for the purpose of attending to this subject. The Board merely introduce a notice of it here, in order that their report may embrace a connected view of all the subjects which receive the attention of the Institute.

For the same reason, they would state that, it having been ascertained that a representation to the Secretary of State on the subject of the existing patent laws would be kindly received, a committee was raised in the Institute for the purpose of addressing a memorial to him on that subject, and that there is reason to hope that at an early day, the existing system, which is confessedly very defective, will be considerably improved.

The library of the Institute is receiving some additions; and the accessions by way of purchases, exchanges, and donations, are such as to give it increasing value. The reading room is daily becoming more attractive, and forms a useful point of union for our members.

The Board regret that the limited means of the Institute do not admit of giving to the library that extension which its importance deserves. The subject must be borne constantly in mind, in order that advantage may be taken of any favourable contingency.

The collection of models and minerals is in the same condition as at the last annual meeting. It is to be regretted that the finances of the Institute do not admit of any appropriation for their increase, but the Board recommend it to the zeal and liberality of their members to lose no opportunity of securing its extension.

Experience has proved the inconvenience attending the want of a collection of the objects that are used in the arts as raw materials, or that result from the various operations practised in laboratories and workshops. To the lecturer on chemistry, such a collection would be of immense advantage, and to the students it would be highly useful by bringing many objects before their eyes, and stimulating them to inquire into their nature and properties. Such a collection would not be expensive, but would require much time and assiduity to complete it. It is understood to be anxiously called for by our professor of chemistry, and the Board recommend it to the early attention of their successors in office.

There is a committee of the Institute, the duties of which are of the utmost importance, and which has, it is believed, been of some benefit to many respectable and ingenious mechanics: we allude to the committee charged with inquiring into all inventions submitted to them, and reporting upon their merits. Its duties are delicate and difficult, but they have hitherto been conducted in a manner to be useful to the applicants, avoiding all causes of offence to those whose inventions they are unable to commend. During the past year many applications have been made to them, most of which have been disposed of by reports.

This committee, as well as most of the standing committees, hold stated meetings once a month at least, and some even once a week. These frequent meetings, although consuming much time, are found to advance very much the interests of the various departments committed to them.

The Board have pleasure in informing the Institute that the diploma of membership, which it is understood has been anxiously wished for by many of the members, has been executed in a manner which they think will be creditable to the taste of the Institute, as well as to the state of the arts in our country. It will be ready for distribution among the members, as soon as a sufficient number of copies can be printed and prepared.

There is an object to which the attention of the Institute was called at the time of its origin, and which it has not yet had the means of carrying into execution. Its importance, and the calls for it, are, however, increasing from day to day. We advert to a chemical laboratory, devoted to practical operations, either in analytical or technical chemistry. There is at present no such establishment in the city; we believe there is none in the United States. In a place where the arts and manufactures are daily extending in importance

and value, the want of it is greatly felt. Our lecturers on chemistry have their time too much occupied by the preparation of experiments for their lectures, to be able to attend much to the practical instruction of pupils. The few professors, who are disposed to receive youths in their laboratories, make this, at most, but a secondary object; it is with them rather a matter of favour than of business. The advantages which France has derived from the able chemists that were instructed in the ancient laboratory of the Royal Mint, and in the more recent ones of Vauquelin, and of the Royal School of Mines, are too well known to require comment. The expense of fitting up such a laboratory would probably not exceed 1000 dollars, and would be amply repaid by the benefits which it would produce. There is not at present a place in which a person having a specimen of the most common iron or lead ore, can have it tested, or its value ascertained. A member of this Board, who at one time pursued this subject professionally, but who has relinquished it entirely, states that he has had more applications during the last year than he had during the four years that he kept a laboratory open in this city for that purpose. It is not improbable that if one were now established, and placed under the care of a skilful and competent individual, the expenses of it might be defrayed by a very reasonable charge for the instruction of pupils, and a small fee on all minerals and other matters brought for analysis or examination. To the community at large, the benefit would be very great, and to the Institute the establishment would be highly creditable. The Board recommend it to the early attention of their successors in office.

During the last year, the Board have elected 264 new members, and have received the resignation of twenty; making an accession to our members of 244, from which however some deduction must be made for deaths and removals not regularly reported to them. Among the deaths, the Board regret to number that of Mr. Joseph H. Schreiner, who for the last five years was one of their associates.

The report of the treasurer hereto annexed, exhibits an account of the receipts and expenditures during the past year, leaving a balance in his hands on the 10th inst. of $\$478\frac{77}{100}$, against which, however, must be placed the outstanding orders drawn by the Board amounting to $\$818\frac{85}{100}$, and leaving a deficiency of cash of $\$340\frac{08}{100}$ to be paid out of the future receipts of the treasury.

During the last year the following gentlemen have become life members.

Anthony Finley,	M. D. Lewis,
Thomas Scattergood,	J. J. Kates,
Robert Hoare,	Michael Kates,
Wm. B. Fling,	C. M. Eakin,
Rudolph Dietz,	W. J. Young.

The Board have not overlooked the necessity of continuing the salutary measures adopted by their predecessors for the reduction of the heavy debt incurred in the erection of their hall; and besides paying all dividends that were claimed to the amount of $\$1515$, they have added the sum of $\$1053\frac{58}{100}$ to the sinking fund, which now

amounts to $7398\frac{81}{100}$, reducing the debt to the stockholders to $826601\frac{19}{100}$.

All of which is respectfully submitted, by

(Signed,) M. D. Lewis,
Chairman.

William Hamilton, *Actuary.*
Philadelphia, January 18th, 1832.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN AUGUST, 1831.

With Remarks and Exemplifications, by the Editor.

1. For *Uniting Cast Iron with Steel and Wrought Iron;* Asa Mallory, and Charles Miles, Concord, Geauga county, Ohio, August 1.

The proposed union is to be effected by bringing the piece of steel or wrought iron to a red heat, then placing it in a mould, applying to it brimstone, or borax, calcined with arsenic, with the addition of sal ammoniac, and pouring the cast iron on it. Or, the piece of steel and cast iron to be united are both to be brought to a red heat, and pressed together with some of the composition between them. Those who unite the metals in this way must use them gently, or the sulphuret of iron by which they are cemented, will assuredly give way. The process is neither new nor of any value.

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2. For an improvement in *Lamps;* Isaiah Jennings, city of New York, August 1.

(See specification.)

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3. For *Locks for Rifles*, called the "percussion side lock;" Elisha Strong, Clarindon, Geauga county, Ohio, August 2.

We have examined the description, drawing, and model, forwarded by the patentee, and with all these aids remain as ignorant of what he intended to patent as we should have been had we not seen either. The modle consists of something like a trigger, which is, probably, to be fixed upon the side of the stock.

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4. For *Applying Horse Power for Propelling Machinery;* Calvin Emmons, city of New York, August 2.

A wheel twenty or thirty feet in diameter, and placed horizontally, is to be turned by a horse. The wheel, so called, consists of a strong nave, or hub, with six or eight arms, ten or fifteen feet long, projecting from it. The hub has an axis passing vertically through it, which axis is fixed firmly in a piece of timber placed beneath it. There is no rim to the wheel, but the spokes are braced together by pieces passing from one to the other, at about one-third of their length from their outer ends. This allows of a space between the project-

ing ends of the spokes for the horse to walk in; the wheel standing no higher from the ground than is necessary for the draft of the animal, and the traces being attached to one of the spokes. The ends of the spokes are notched, to receive a band, they being intended to operate as a band wheel; this band extends out, and passes round a whirl, from which motion is to be communicated to any machinery which is to be propelled. The claim is to the construction and arrangement of the several parts of this apparatus. Its superior advantages we do not perceive.

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5. For machinery for *Jointing Staves;* Isaac Fobes, Bridgewater, Plymouth county, Massachusetts, August 3.

This jointing machine consists of a wheel turning horizontally, through the upper side, or face, of which project four, or any convenient number of irons, or cutters, passing in from below in the manner of plane irons. The face of this circular jointer is made concave from the outer towards the inner edge, the irons being adapted to this curvature; which is such that when the edge of a stave is placed upon it, the jointing shall leave it with the proper swell in the middle.

A rest is provided, against which to bear the stave whilst jointing.

The claim is to the principle upon which the machine operates, or, in other words, to the concave faced revolving jointer. Among the many jointing machines which we have seen and described, there certainly is not one which operates upon this principle. The only objection which we see to it is that the irons work against the grain for one half the length of the stave.

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6. For improvements in the *Mode of Kiln Drying Wheat Flour, and other kinds of Meal,* by the agency of heated air, or of steam, operating in an apparatus adapted to the purpose; Nathan Tyson, city of Baltimore, August 8.

We are waiting the result of some experiments now in progress by the patentee, which when completed will be published with the specification and an engraving of the apparatus.

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7. For a *Screen for separating Grain from the Straw,* called the horizontal revolving jointed screen; Peter Broughton, Charleston, South Carolina, August 5.

An endless apron is to be made of wove wire, which is divided into segments held together by leather straps; each segment is to be of such a width as to correspond with the flat sides of two hexagonal rollers, by which the endless apron is made to revolve. The straw and grain, as they leave the thrashing machine, are to be conducted in between the two sides of the revolving apron, at its upper end, which is a little elevated above the delivering end. The grain is to fall through the screen, and to be conducted to a winnowing machine, and the straw, when it arrives near to the second roller is to be thrown

off the screen by a sloping board placed for that purpose. There is no claim made.

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8. For an improvement in the common *Pump* for pumping water, Jesse Reed, Marshfield, Plymouth county, Massachusetts, August 5.

The chamber, and the whole of that part of this pump which is above ground, is to be of cast iron, and is to be attached to the descending shaft by a flanch with suitable bolts, allowing it to be removed with ease for the purpose of examination and repair. There is to be a thumb screw which, by being turned, will raise the valves, let off the water, and thus prevent freezing. There is but little of tangible novelty in the whole thing, and the patentee appears to be rather uncertain about his claims, as he makes them with this proviso, "unless the same have been used without the knowledge of your petitioner."

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9. For an improvement in the *Piano Forte Action;* Jesse Thompson, city of New York, August 6.

A lever, called an angle lever, is applied directly to the key and hammer, causing the blow to be struck the instant the key is moved. Judging by an inspection of the drawing, we should form a very favourable opinion of this action, which is much more simple and direct than those commonly constructed. The claim is to the angle lever alone.

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10. For an apparatus to *Filter Sirop, and wash the animal-black, and other substances used for clarification;* Thomas Osenard, a citizen of the United States, now residing at Marseilles, in France, August 6.

This apparatus is intended principally for the use of sugar refiners and confectioners; it is complex, but is well represented on two lithographic drawings which accompany the specification. We shall not attempt a description of it, as without the plates it could not be made clear.

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11. For a *Washing Machine;* Nathan Hackett, Green, Clinton county, Ohio, August 6.

This machine, we are told, is to wash with or without steam. The box, or trough, to contain the clothes, has its lower part semicircular. A shaft suspended from the centre of the curve has two wings, or levers, upon it, which vibrate in the box; these wings are perforated with holes to allow the water to pass through. A stationary partition in the centre of the box, divides it into two parts; this partition also has perforations similar to those on the moveable wings. A vibratory motion being given to these wings by means of a crank on the shaft, the clothes are thus squeezed between them and the stationary partition. There is no claim made.

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12. For *Graduating Moulds for moulding and shaping*

Timbers for Boats and other vessels; James Wallace, Rochester, Monroe county, New York, August 9.

By the invention here patented it is intended to make one set of moulds answer the purpose of laying out timbers for vessels of all sizes. The moulds are to be divided, to have moveable joints and gauges, and to be kirfed in a way particularly explained and laid down in the drawing. The whole arrangement must be shown in order to give a correct idea of the inventor's plan.

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13. For a *Machine for hulling and cleaning Clover Seed;* Lemuel White, Adams county, Pennsylvania, August 9.

This clover machine is to be made pretty much like the ordinary cylinder thrashing machine, but it is to have two cylinders and two concaves adapted to them. The cylinders and concaves may be made of cast iron or of wood, and be covered with emery; or they may be covered with cards, so fixed that the teeth shall point with the motion of the cylinders, which is to be with their upper sides receding from each other. There must be a hopper for feeding, and a riddle and fan may be placed below, and moved with the machine.

The claims are to the use of two cylinders and concaves, the cylinders revolving as described; the mode of gearing; the plan of placing the cards, and of coating the cylinders and concaves with emery.

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14. For an improvement in the machinery for *Making Biscuits and Crackers;* John S. Stiles, city of Baltimore, August 9.

The dough is to be worked by a break, made very much in the manner of that now used, with angular slats striking upon it. The table upon which the dough is placed is to have a vibrating top, operated upon by a cam, that the breaks may not strike a second blow on the same place.

After being otherwise prepared the dough is to pass between two or more rollers, to reduce it to a proper thickness. It is then to be received between two other rollers, one of which is to have circular cutters, with proper dockers and letters, and the other may be covered with leather or any suitable substance. In each of the moulds there is placed a sliding piston, perforated for the dockers to pass through. This, by its weight, or by the action of a spring, causes the biscuit to fall out of the mould after it escapes from between the rollers.

The patentee acknowledges that all the parts described have been used before, "but not in the same connexion, or applied to the same purpose;" and claims the combination and application as described. On the 13th of June last, (vol. viii. p. 343,) Messrs. Fairlamb & Dunott, of Wilmington, Delaware, obtained a patent for a machine in which they apply some of the same parts "in the same connexion" "to the same purpose," and they expressly claim the moulding and docking by cylindrical pressure.

15. For an improved *Stock;* William Carlock, city of Baltimore, August 9.

This stock is to be cut in one entire piece out of hair cloth, with cotton or silk warp. After being cut it is to be stiffened with starch, or some similar substance. It is to receive its proper shape by being bent round a heated mould of the proper form, upon which it is to remain until dry. If the warp is of silk, it may be trimmed without first covering it; if of cotton, it may either be japanned or covered with any suitable material.

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16. For an improved *Standing Press;* John H. Stewart, county of Philadelphia, Pennsylvania, August 11.

This standing press is to have screws on each side instead of cheeks. Upon these screws are fitted nuts capable of turning, and which are to be attached to the platten, or follower, with a swivel joint. Upon each of these nuts, or screw boxes, there is to be a cog wheel, and between these a pinion gearing into each of them. The shaft of this pinion will be vertical, and on it may be placed a crown or bevel wheel, which may receive motion from a pinion upon a crank, the shaft of which runs in bearings upon the top of the follower. By turning this crank vertically, the nuts will be made to ascend and descend upon the screws, and any desired power may be obtained, according to the proportions observed in the gearing. Several variations of the principle are alluded to; this particular mode of constructing, or rather of gearing, the press, not being the object of the patent. We are told in the commencement of the specification, that "the improvement consists in constructing the press in such a manner as to dispense with the posts, or upright parts of the frame, and so that the power may be applied vertically." In the claim at the end of the specification, we are informed that the parts believed to be new, and constituting the invention, "are the construction of a standing press without the use of posts or upright timbers in the frame; the screw bolts so arranged as to operate as posts or supporters to the upper part of the press, at the same time that they perform the operation of screws. And also the application of power to a standing press in a rotary vertical manner, by the means of wheels and pinions, with handles, levers, cranks, or other fixtures for the application of the power."

At page 346 of the last volume there is a specification of a patent granted to Charles Evans, of Philadelphia, on the 13th of June last, which fulfils most of, if not all, the conditions of the above claim. Mr. Evans expressly claims "the application of screws instead of cheeks to the sides of the standing press." He also turns his gearing by means of a handle or crank "in a rotary vertical manner." The only noticeable difference is that Mr. Evans uses an endless screw in preference to a pinion, but the question of identity can scarcely rest upon the difference here noticed.

17. For applying *Zinc, or Spelter, to the making articles of various kinds*; Samuel Davis, city of New York, August 11.

The patentee tells us that he has made the discovery that weights of from one ounce to fifty-six pounds, may be made out of zinc; and also that book binders' plates, chaffing dishes, portable scrapers, baking plates and griddles, may be formed out of the same substance, and therefore prays that he alone may have the right to make the articles thus specified.

There is something really curious in the progressive discoveries of the patentee of the above articles of zinc. By a patent dated October 1, 1830, (vol. vii. p. 368,) it appears that he had then discovered that milk pans might be made out of zinc. Another, dated April 18, 1831, (vol. viii. p. 124,) tells us that he had in addition discovered that many articles of hollow ware for cooking, as well as others for use and ornament, might be so made; and it will be seen above, that he has made further discoveries of a similar character, and one of the number is, that weights as low as an ounce, and as high as fifty-six pounds, may be made of zinc. If these are patentable discoveries, the iron founder may patent every article which he casts in a new form, and close the furnaces of all competitors.

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18. For *Shears for cutting Paste Board, Sheet Iron, &c.*; Alvah Hardy, city of Boston, Massachusetts, August 12.

The inventor calls these shears "curved edge shears." He makes them in the usual manner of those shears which have the fulcrum at the end, and he curves one or both edges, in such a degree as to cause them in cutting to meet at nearly the same angle throughout their whole length. When the curvature is given to one edge only, it is to the upper one. A weighty knob is to be formed on the end of the handle to assist, by its gravity, in cutting.

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19. For a machine for *Hulling and Cleaning Clover Seed*; William Williams, Buckingham, Bucks county, Pennsylvania, August 12.

There is a feeding apron upon which the clover is laid, and by which it is carried towards the body of the machine; the clover falls from off this apron into a vertical opening, situated between a revolving fan wheel and the hopper. Stones, sand, and other heavy articles descend entirely through this opening, as do seeds which are heavier than the clover, whilst the latter is driven by the air from the fan up an inclined plane into a hopper. Below the hopper there is a revolving cylinder, covered with sheet iron, and set with fine teeth; this revolves within a hollow segment which embraces nearly three-fourths of its circumference. This segment is also set with teeth, excepting the last portion of it which is punched so as to form a grater. The cylinder and segment are adjustible by wedges.

The claim is to the peculiar arrangement of the parts as described.

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20. For a *Machine for Gumming and Trimming Saws*;

Joseph Spencer, Canajoharie, Montgomery county, New York, August 15.

If those persons who have taken patents for machines for gumming or cutting the teeth of saws, had visited the manufactories where these instruments are made, they would have discovered that the manufacturers know as well as any body, how to cut saw teeth; and that the machines which have been patented are mere variations, or modifications, of such as are well known. The one before us is in fact a bed and punch, with a gauge for regulating the distances of the teeth, acting upon principles, and in a manner, long in use.

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21. For a machine to give an *Alarm when a Building takes Fire;* Ithiel S. Richardson, New Market, Rockingham county, New Hampshire, August 15.

An alarm bell is to be attached to suitable wheel work, which, when acted upon by a weight suspended from a barrel, will cause a hammer to vibrate within the bell, and sound the alarm. From this apparatus, a string extends to the different apartments of the house, being conducted round angles by means of pulleys; this string is attached to, and supports a weighted lever, which checks the barrel of the wheel work, but if the string be burnt off in any part, this weighted lever will be liberated, and the alarm sounded.

A particular manner of combining and arranging the apparatus is described, and represented in the drawing, and the claim is to the mode of arrangement described. Any one, who is well acquainted with machinery, could devise modes very different from that given by the patentee. He, however, was probably aware of the fact, that the same principle, the burning off of a string, had been applied to the sounding of an alarm in case of fire, and thought it best, therefore, to confine himself to his own particular plan.

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22. For a machine for *Edging Metallic Plates for Roofing;* Daniel A. Piper, Cincinnati, Hamilton county, Ohio, August 15.

Two stout pieces of plank are to be hinged together like double shutters; upon the hinged edge of one of them, a rebate is to be formed, which may be covered with iron, and upon the edge of the other piece of timber an iron plate is secured by screws. The tin to be edged is slipped into the rebate, when the timbers are folded together, and the edging effected. This, the patentee tells us, is a much better mode than the old one, which required the use of a hammer; we can assure him, however, that it is a much worse mode than that supplied by other machines which have been invented for the purpose, and which do not require or admit the use of a hammer. Such machines, it seems, have not yet travelled to Cincinnati, although they are well known in the northern states.

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23. For an improvement in *Brick Moulding;* David Fox, Ashtabula, Ashtabula county, Ohio, August 15.

This machinery is too complex to be described in words, excepting in a very general way. There is a hopper into which the prepared clay is to be put; under this hopper the moulds are made to pass in succession by the action of a lever, the empty moulds pushing the full ones forward, whilst another lever gives motion to a follower and other apparatus which forces the clay from the hopper into the mould, and also operates upon a scraper which removes what is superfluous.

The claims are to the strike and press as constructed in this machine, and also to the scraper, the forcer, the peculiar angles of the two levers, and some other parts which it is unnecessary to mention.

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24. For *Machinery to be applied to Grist Mills, Saw Mills, &c. &c.* called the 'roller and balance wheel power;' Joel Ester, Brownsville, Haywood county, Tennessee, August 15.

This machinery is to be the guide, governor, and director, of machinery in general, as it is to be a first mover to drive mills of all kinds, and to propel boats. It is proposed, in most cases, to use the power of a horse to communicate the first motion, as in the common horse mill. From the large horizontal wheel which the horse turns, wallowers, counter wheels, large and small balance wheels, an inclined wooden wheel twenty or thirty feet in diameter, and, at the end of this train, a mill of any description, are all to be set in operation. It appears altogether uncertain whether the horse, or any extraneous motive power, will be really required, as, under ordinary circumstances, "one horse gives the power of ten or fifteen." But if the machinery be increased in size, "the large balance wheel being thirty feet, or from that to forty, in diameter, with a heavy rim, and its balance wheels well proportioned, it is believed it will move and turn in *perpetuam* without the aid of a horse."

When an individual is so far gone as to imagine that a machine will move the more readily the more you load it, it is of no use to reason with him, least he turn again and rend you: the only wise course, is to allow him to make his machine, and to load it until either he or his contrivance, is broken.

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25. For an improvement in the *Horse Rake;* William Phillips, Middlesex county, New Jersey, August 15.

The principal improvement in this rake consists in applying four small wheels to it, two at each of its ends. These wheels are of such a size as to keep the teeth of the rake at the proper distance from the ground, whilst they are to take off the friction usually experienced in similar instruments, and to render the draft perfectly easy. By the aid of the handles which serve to guide it, and of others upon which a boy is to operate, the rake is to be relieved of its accumulated load, without checking the motion of the horse.

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26. For an improvement in the *Manufacture of Sugar;* William Augustus Archbald, Sugar Refiner, city of New York, August 16.

The improvement here proposed consists in converting the sirop, or cane juice, into loaf sugar, without first granulating it, and forming it into raw, or other, sugar. The juice, it is said, should be prepared in the way specified in the patent granted to Mr. Archbald in the month of April, 1830; after which it may be boiled down to twenty-six or to twenty-eight degrees of Beaumé's sachorometer, if intended for immediate use; but if for keeping, or transportation, to from thirty-six to forty degrees. When of the lower density, for immediate use, it is to be examined by test papers to detect any acidity, which is to be corrected by milk of lime, prepared in the ordinary way, and added in small quantities until the acid is neutralized.

When perfectly neutralized it is to be put into a boiler, and heat applied until the sirop boils, the heat from steam being preferred. Three pounds of fineings are to be put in in addition to the portion originally employed, as directed in the patent referred to; this three pounds of fineings is the proportion for every thirty gallons of sirop. After boiling for two or three minutes it is to be filtered through animal charcoal; or, instead of filtering, from five to ten pounds of animal charcoal are mixed with the sirop, the boiling stopped, and a quart of bullock's blood thrown in to the above named quantity. When intimately mixed the sirop is to be again heated until the scum rises. Should it not prove perfectly clear, more blood is to be added in the same way. The whole is to be allowed to settle, and is afterwards strained through a filter, Howard's being preferred.

Sirop prepared in the ordinary way, it is said, may also be boiled down and treated according to the same principles, for the purpose of converting it at once into lump, or loaf, sugar.

The advantages of the process are said to be a considerable increase of *fine* sugar from a given quantity of juice, and the saving of much time, labour, and expense.

The claim is to the process by which loaf or lump sugar is made from the cane juice, without first converting it into raw or dry sugar.

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27. For an improvement in *Trusses for the cure of Reducible Inguinal Hernia;* Amos G. Hull, city of New York, August 17.

A patent was first obtained for this truss on the 17th of July, 1817, and last on the 20th December, 1830. Between these dates the patentee surrendered his patent three times, namely, on the 27th of February, 1823, on the 19th August, 1824, and on the 20th October, 1829. The patentee states, however, that his instrument was brought to its present improved state on the 27th February, 1823, and in the petition for his present patent requested that it might be issued to bear date from that time. This, we understand, has been done, and the improvements which he has made incorporated in the amended specification. Notwithstanding the high authority by which, as we are informed, this procedure has been sanctioned, we are fully of opinion that his present patent will be invalidated if examined in court. The patent of February, 1823, dated from July, 1817, hav-

ing been issued upon a surrender of the first patent, was therefore the same instrument amended, and, of course, it expired on the 17th of July last. By reissuing it, as though the original had borne the date of 27th of February, 1823, the patent is obtained for nearly twenty, instead of fourteen years, the legal term.

Independently of the last consideration, the fact that the patentee has not merely corrected what was error in his former specifications, but has introduced improvements not originally contemplated by him, makes the present, essentially, a new specification. This new matter might, legitimately, have been the subject of a patent for an improvement, but cannot, certainly, be employed to lengthen out claims to that which, by the terms of the patent law, has become public property.

It is probable that before the present number of this journal is printed, we shall have something further to say upon the subject of reissued patents, as we expect the decision of the Supreme Court respecting it.

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28. For an improvement in the mode of *Fastening the Soles and Heels upon a Boot or Shoe*, with wooden or metal pegs, and of paring the same; Wales Tileston, Charlemont, Franklin county, Massachusetts, August 18.

A block is to be prepared of the size of the sole of the boot or shoe, and of such curvature as to fit on to the sole when placed upon the last. This block is to be of a thickness corresponding with the length of the pegs to be driven, and is to be perforated near its edges with as many holes as there are to be pegs. From the back, or upper side of this block, two pins, or tenons, rise, upon which other plates, or blocks, provided with corresponding mortises, may be passed down into contact with the first. A second block, or plate, of the same size with the first, is placed upon it, being guided by the mortises and tenons. This block is perforated with holes corresponding with the first, and has projections from its edges by which it may be fixed to, and hold the work fast in, a frame.

A third block is prepared, with mortises to slip over the pins, or tenons, and with as many awls fixed in it as there are holes in the other blocks; they must be of sufficient length to pass through the two former blocks and to perforate the soles; to effect which any adequate power may be applied. When this block, containing the awls, is removed, pegs are dropped into the holes, and a block filled with blunt pointed wires, instead of the awls, is then applied and made to press upon the pegs, and drive them into the sole. This last block may be surrounded by a knife, or cutter, which, whilst the pegs are forced down, will pare the sole. A similar apparatus is to be used for the heels.

There is no claim made.

A patent was granted to Nathan Leonard of Merrimack, New Hampshire, June 11th, 1829, for a mode of pegging essentially the same with the foregoing. An account of the invention will be found

at p. 180, vol. iv. The first perforated plate, a plate with awls, and one with blunt wires, are all particularly described in that patent.

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29. For a *Wheat Rubber, for cleaning Grain;* David Marracong, Skaneateles, Onondago county, New York, August 18.

Sheets of iron, perforated with holes so as to form rubbers, like graters, are to be nailed upon wooden planks, and the upper one is to receive a vibratory motion by means of a crank and pitman. Cleets are to be placed along the edges of the rubbing boards, to keep and guide them in their places. The grain is to be let on by a suitable spout.

There is no claim made, and the apparatus is so similar to what has been before used, as scarcely to leave room for any.

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30. For a machine for *Sawing Shingles,* Clap Boards, &c. Jonathan Hobbs, jr. Falmouth, Cumberland county, Maine, August 18.

We shall not attempt to give any idea of this machine further than to say that a circular saw is used in it, and that there is an apparent complication of parts about it, which would require more time and attention for its examination than we can at present devote to it. The specification itself is five yards long, and closely written, and refers throughout to numbers upon the drawing. Without this, therefore, the ideas of the patentee could not be made known; and as these do not appear to extend to any thing new in principle, but to be confined to the special arrangement of the respective parts, we pass them without further notice.

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31. For a *Washing Machine;* John Shull, New Petersburg, Highland county, Ohio, August 19.

This is a steam washing machine, and not very different from several others already patented. The body of the machine is in the form of a barrel churn, and is placed on trussels. There is a cover fitting closely at the top of this barrel; within it a shaft revolves, carrying an interior cylinder, perforated with holes, and operating like the dashers of a churn. The clothes are to be put within this inner cylinder through openings prepared for the purpose. There is a boiler with a safety valve, and a steam tube leading through the end of the outer vessel. The operation need not be further described.

The claim is to the formation of the inner revolving cylinder, and the admission of steam in the manner described.

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32. For a *Washing Machine;* Webber Furbush, Hallowell, Kennebeck county, Maine, August 19.

This is a true old fashioned washing machine, consisting of a trough the bottom of which is curved, and over which rollers, set in a proper frame, are made to vibrate, and pass over the clothes placed upon the bottom. This bottom the patentee calls a smooth apron, and he very boldly claims nearly every part of the machine. He says, "I

claim the use of the rollers in the side pieces—I claim the use of the smooth apron—I claim the mode of applying these to use in a box or tub."

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33. For an improvement in the art of *Distillation;* John Cairou, city of Boston, Massachusetts. Patent first issued January 10, 1831; surrendered on account of a defective specification, and reissued August 22.

We remarked upon the original specification of this patent at p. 304, vol. vii. to which article we refer; the reference to a model throughout the specification, was particularly noticed, and it is now said that "the errors which render the existing patent defective, are a reference to a model of Mr. Cairou's machine for explanation of various parts of it, which are not sufficiently described in consequence of his supposing such a reference, (viz. to a model,) would supply the deficiencies of description—and other errors of similar character."

Mr. Cairou observes that although he is the original inventor of the column described in his specification, he does not now claim letters patent for the same, as detached and separate from the other parts of the apparatus; but what he claims is the combination of the several parts, to produce the effect described.

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34. For an improvement in the *Turnabouts for Rail-roads;* James Stimpson, city of Baltimore, Maryland, August 23.

The *turnabouts* for rail-roads are circular platforms large enough to receive a rail-road car, and placed level with the track. By their means a car can be turned entirely round, or into a road crossing that upon which it originally stood.

Turnabouts have been patented in this country; (see vol. vi. p. 291.) When Mr. Fairlamb's patent was issued, we were not aware that such turnabouts had been already introduced in England, but this being the fact, the patent here was not valid, although the patentee might have been a real, though a second, inventor. The present patent is taken for improvements upon the mode of forming them; some idea of the nature of which improvements may be derived from the claim, which is as follows:

"What I claim as my invention or improvement, is the application of cast iron for the platform of the turnabout, in form aforesaid, or any other manner. Also the construction of turnabouts as above set forth. Also the double tracks on turnabouts at right angles with each other, as herein set forth. Also the cheek bolts for fastening turnabouts in their proper positions by its own movement, caused either by gravity, or otherwise, for any kind of turnabouts. Also the stone or brick curbing surrounded with iron plates, as above set forth, or otherwise. Also the connecting the track rails with those under them, and the transverse timbers for security against frost, &c., as used as the foundation of turnabouts, as above set forth, or otherwise."

We think the above claim rather too comprehensive and sweeping throughout; we doubt the validity of a claim, for example, to the application of cast iron for the platform, in form aforesaid, *or in any other manner*, &c. &c.

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35. For an improvement in the construction of *Wheels for Rail-road Carriages;* James Stimpson, city of Baltimore, Maryland, August 23.

It is observed in the specification that the side of a wheel to which the flanch is attached, is much the strongest, whilst the opposite side is the most subjected to those accidents which tend to break the wheel; the improvement proposed is to strengthen this side of the rim by a ring of additional metal in the casting; and the patentee says he has no doubt that fifteen pounds of metal, forming such a ring will give more additional strength to the wheel, so as more effectually to protect it from breaking, than one hundred pounds equally distributed throughout the whole of the rim.

The claim is to "the application of the rim, ring, or felloes, inside of the tread, or rim, or inner periphery of the wheels, opposite to the flanch."

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36. For an improvement in the mode of *Ascending and Descending Rivers, and Canals, or Inclined Planes*, using such steam engines, or other locomotive power on board, or within the vessel, or vehicles to be moved, as may be found necessary for their ascent or descent; James Stimpson, city of Baltimore, Maryland, August 23.

Firm fixtures are to be made at the upper and lower ends of the planes which are to be ascended or descended, and chains, which may be of the kind used for cables, are to extend from one to the other of them, being supported on the ground, or on fixtures placed for that purpose. A shaft is to extend across the ways of the inclined plane, and when there is a chain on each side of the ways, there are to be cast iron pulleys on each end of the shaft; which pulleys are to be so cast that the links of the chain may fit precisely into them, there being hollows in the middle of them, and indentations in their cheeks, or flanches, for that purpose, which will prevent the chain, as it lies upon them, from slipping. There may be three, or more pulleys, of different sizes, to be used in different ascents. By means of cog wheels, with which the vessel, or carriage, is to be provided, power is to be derived from the steam engine, or animals, &c. within the vessel, to act upon the shaft carrying the pulleys, and thus to make the desired ascent.

The specification, which goes much into detail, includes a great variety of propositions, but the following are the claims made. "The application of chains to ascend and descend upon rivers and canals, or inclined planes on rail-roads, or otherwise, said chains being made fast at both ends near the foot and top of the inclines, and resting upon the ground or other material, or at suitable places in rivers or

canals, the locomotive, or other engines, drawing themselves up, or letting themselves down said inclines, rivers, or canals, by the power which is on board of themselves by the agency of pulleys in contact with said chains, as set forth in this specification, *or in any other way;* also the variable speeds or powers as herein set forth, *or in any other way.* For locomotive carriages on rail roads, not using the chain, I also claim the application of machinery to change the moving power from the road wheels of locomotives upon rail-roads where the inclination is too much for the adhesion of the wheels to the rail plates to allow them to ascend or descend without slipping or sliding upon said rails, to a pulley shaft as aforesaid, or any other thing whereby said purpose is used in a different manner than in immediate contact with the road wheels, or their axles, as set forth in this specification."

We might here repeat a portion of the remarks made on the last specification, as we think the present claim much too broad. The plan itself, however, appears to us to be altogether impracticable in the form presented, and its details exhibit a want of knowledge in the most advantageous modes of applying power.

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37. For an improvement in the *Mode of turning short curves on Rail-roads*, such as the corners of streets; James Stimpson, city of Baltimore, August 23.

The plan proposed is to make the extreme edges of the flanches flat, and of greater width than ordinary, and to construct the rails in such a manner that where a short turn is to be made, the extreme edge of the flanch shall rest upon it, instead of upon the tread of the wheel; thus increasing the effective diameter of the wheel in a degree equal to twice the projection of the flanch. The claim made is to "the application of the flanches of rail-road carriage wheels, to turn short curvatures upon rail-roads, or tracks, particularly turning the corners of streets, wharves, crossing of tracks, or roads, and passing over turnabouts, &c.

On turning to pages 270 and 271, vol. iv. there will be found specifications of two patents granted to James Wright, of Columbia, Pennsylvania, for the mode of turning curves claimed by Mr. Stimpson. The only difference is, that Mr. Wright proposes to adopt his cars to several different curves, by having three, or more, offsets in his wheels, when necessary.

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38. For an improved mode of *Opening and Shutting Switches on Rail-roads;* James Stimpson, city of Baltimore, Maryland, August 23.

Those who know any thing of rail-roads are aware that what are called switches, are pieces of iron employed at turn out places, which pieces, or bars of iron, have to be opened and closed, according to the track upon which the carriage is to travel, and that accidents have frequently occurred in consequence of the switches not being opened or closed as required. The plan proposed in the specification of the above patent, is to arrange certain levers, and other machinery, so

that a piece projecting from the carriage shall operate upon the switch and give to it its proper direction, either by day or night, without personal attention on the part of the person having the care of the carriage. The claim is to "the application of machinery to open and shut switches, whereby the drivers of carriages, or superintendents of locomotive engines, or others, without stopping, or leaving their seats, carriages, or horses, can open and shut switches, *if in order*, by night, or by day, without seeing them, by machinery, as set forth in the above specification, *or in any other way or manner.*"

The contrivances proposed, "if in order," might answer the purpose, but from their complexity, we apprehend that they would prove to be traps rather than protectors.

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39. For an improvement in the mode of *Forming and using cast or wrought iron plates, or rails, for Rail-road Carriage Wheels to run upon;* James Stimpson, city of Baltimore, Maryland, August 23.

The claim in this case is to "the application of cast or wrought iron plates for the use of rail-ways on the streets and wharves of cities, or elsewhere. The objects of said improvement being to employ rails that will not present any obstacles to the ordinary use of streets, or sustain injury therefrom, and so to form the plates at the intersections of streets, or other crossings, that cars will readily pass over them, and also on circles of small radius."

The rails are to be formed with a groove in them to receive the flanches of the wheels; on one side of the groove, the width is to be sufficient for the tread of the wheel; on the other, it need not exceed three-quarters of an inch. These rails are to be laid flush with the pavement of the streets. At corners to be turned the rails are to be cast, or made of the proper curvature, one of them only being provided with a groove, as the flanch is to run upon the other, upon the principle described in No. 37. Provision is to be made by scrapers, or brushes, preceding the carriages, to clear the grooves of dust, ice, and other obstructions.

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40. For an improvement upon *Dearborn's Patent Balance;* Uel West, and Daniel Loring, city of New York, August 23.

The alteration or improvement here patented, consists in so making the beam of the steelyard, or balance, as that the hook upon which the scale, or article to be weighed, is hung, shall be much nearer to the fulcrum than it has hitherto been placed in Dearborn's balance. For this purpose, it is sustained upon a pin between two cheeks, almost directly under the fulcrum. The object to be accomplished is to weigh a given weight with a beam much smaller than usual. The patentees state that a beam then before them, will weigh twenty times as much as any other of the same size.

There can be no doubt that the end proposed can be obtained by the prescribed means; but one other thing is equally certain, namely,

that the accuracy of the instrument will be sacrificed in a degree exactly proportioned to the extent to which this improvement is carried.

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41. For an improvement in the *Machine for weighing Canal Boats, Loaded Wagons, &c.;* Daniel Loring, Newark, New Jersey, August 23.

The general principles of this machine are well known to engineers. The claim made is to the form and general arrangement of the combination of levers of which it is principally composed; and the steel edge bearings, the bearings heretofore used being points, which soon wear out, and require to be repaired or renewed, whilst edges, well made, will work equally well, and are much more durable.

The use of edges for the fulcra of such weighing machines, is not new. Those patent weighing machines made by Mr. Ellicot, of Philadelphia, have steel edges.

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42. For an improved portable *Smut Machine;* Henry Weed, and Stephen Fellows, Sandwich, Strafford county, New Hampshire, August 23.

This smut machine is much like some others, and the improvements claimed to have been made by the patentees do not essentially alter it.

A box or chest is to be made to contain the machine. A cylinder, about twelve inches in diameter, and four in height, is made to revolve vertically, by a strap passing round a whirl on its shaft. This cylinder may be left smooth, or it may be covered with sheet iron cut into strips, or brads made rough, or nails in clusters, may be driven into it. A sheet iron cylinder, punched from the outside, so as to form a grater within, is to surround, and stand at a suitable distance from the revolving cylinder; between these, of course, the grain is to pass, the feed being from a hopper, the grain falling from it on a seive, and from that on to a second seive, kept in motion by a crank. A fan also is kept in motion, to blow away the chaff and dust.

What is claimed as new, is "the placing the machine in a chest. The shape of the brads. The making them rough. The manner of placing them in the cylinder. The driving of the nails in clusters. The cutting sheet iron into strips, and making them rough like rasps."

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43. For a *Saw Trimmer;* Adam Clark, jr., Berne, Albany county, New York, August 24.

This saw trimmer, or instrument for gumming saws, as it is usually called, purports to be an improvement on a similar instrument patented by John R. Fairling and Robert G. Nellis, April 27, 1831. We are told that instead of making it in detached pieces, and fastening them together by a screw and nut, as they did, the present instrument, though similar in form to theirs, is made somewhat larger, and in one entire piece of cast iron. The claim is made to the foregoing improvement.

In our estimation, neither of the patents is of any value, because we do not think them new. The specification of this last patent places in a strong point of view, the trifling change upon which many persons imagine a patent may be founded. The drawing of this instrument, and of that noticed at No. 20, are strikingly similar.

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44. For a machine for *Cutting Laths from Boards;* Jacob Jameson, Springfield, Clarke county, Ohio, August 24.

This machine consists, principally, of two rollers, between which the board to be cut into laths is made to pass. The lower roller is smooth, and merely sustains the board. The upper roller is furnished with circular knives of about four inches in diameter, passed on to an iron shaft, with collets between them to regulate their distances. There are two cranks, one at each end of the roller containing the knives, and the turning of these cranks draws the board through, which is delivered in the form of laths. The frame for sustaining the rollers, and guiding the board, we need not describe. We presume that the boards are to be first sawed to the *thickness* of the laths, and that they are only cut to a *width* by the knives, and the drawing also seems to indicate this. Such knives would not cut through an inch board of the softest wood, so as to form it into laths.

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45. For a *Plough;* William Savage, and Hezekiah Davidson, Barren county, Kentucky, August 24.

The plough looks pretty much like other ploughs, and we apprehend that all the improvements of which this instrument is susceptible, is in its details. In the present instance, the claim to improvement consists in "the wing and bar being in separate pieces, and confined by a nib and socket together, with a horizontal screw entering through the wing, mould board, and upright," "so that by taking out said screw, the wing can be taken off and sharpened, or laid, as easily as a common weeding hoe, leaving the bar always fast to the stock; the regulator, also, to make the plough cut deeper or shallower; all these things we claim."

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46. For a method of *Propelling Boats*, and various kind of machinery, called the "self-supporting chains;" Billy Todd, Marietta, Washington county, Ohio, August 24.

When Redheffer's perpetual motion refused to go, a gentleman who had formerly been numbered among its advocates, when reminded of his former opinion, observed that he should insist upon it that it was "perpetual motion, still." The present patentee may derive a lesson from this anecdote, when his propellers refuse to do their duty.

Two endless chains are to be made of cast iron; the links are to be in the shape of key stones, and are to be hinged together at their narrower ends, so that they will form an arch when their wide ends are uppermost; each of the links may measure about six inches each way. The two endless chains thus formed, are to be passed over a shaft, at the distance of a few feet from each other. Planks are to extend from

one chain to the other, mortises being cast in the links for the purpose of receiving them, so that each pair of links has its plank, the whole forming a continued floor.

For a two horse power, the links are to be of the size above mentioned, and will weigh about twelve pounds each, and, according to the drawing, from fifty to sixty of these will form one of the chains. These, with the floor, and the cattle, *or water*, by which it is to be operated upon, will form a load which has to be sustained by the cast iron links, and the wrought iron pins which form the joints, or hinges; and should these pins, or the cast iron, give way, wo to the animals employed.

The inventor says that he expects and claims the right to use this apparatus for propelling boats, and all other kinds of machinery, either by animals walking upon the floor, or by placing upon it buckets like those of an overshot wheel, and moving it by water. He also claims the right of placing one shaft higher than the other. He also claims the right of varying the size of the chains, and of making them of other materials than cast iron.

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47. For an improvement in the mode of *Making Beds*, called the spring bed; Josiah French, Ware, Hampshire county, Massachusetts, August 25.

A foundation is to be made by uniting boards together, the length and width of the intended bed. Wire, of about an eighth of an inch in diameter, is to be bent round a cylinder of four inches in diameter, so as to form it into spiral springs of about eighteen inches in length. A frame of the dimensions of the bottom is to be provided, and the springs are to be attached to the bottom, and by their upper ends to this frame. The two are to be drawn together until they are about nine inches apart. On the top of the springs a covering of cotton batten is to be placed, and a covering of duck is to be strained over the frame, covering the cotton batten and the springs. This will also be carried over the sides, and be nailed to the board bottom. Cotton batten, or other soft substance, is to be laid upon the duck, to form the filling of the bed; and when ticking is strained over this, and is nailed to the bottom, the bed is completed.

Until experience convinces us that we err in judgment, we shall rest satisfied with, and, we hope, comfortably on, a good curled hair mattrass, or in winter, if pleasure is preferred to health, a well filled feather bed will continue to satisfy us, and be preferred to iron springs.

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48. For a *Kiln for Burning Lime*, with anthracite coal; Joseph M. Downing, Bristol, Bucks county, Pennsylvania, August 25.

This kiln is for the burning of lime by means of anthracite, and the patentee, who has had it in actual operation, states that the lime produced by it is free from coar, and equal for all purposes to the best lime burnt with wood. The kiln is built of stone, with lime mortar, and is lined with fine brick, soap stone, or some similar substance.

The general form of the interior is that of an egg standing vertically, with its top truncated, so as to leave an opening for feeding.

There are no grates, or bars, at the bottom, the lime being allowed to settle down, and is to be withdrawn through an opening left for that purpose.

The stone to be burnt is broken into pieces, the largest of which shall not exceed six inches in diameter. In charging, the larger stones occupy the middle of the kiln. About one-fifth as much coal, broken fine, as there is of stone, is intimately mixed therewith, when both are of the ordinary quality, with this, however, the quantities must be varied.

The claim is to the so constructing the kiln as to dispense with the arch, bars, or grates, to sustain the lime and fuel; and to the general form of the structure.

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49. For an *Instrument to Plumb and Level;* Joseph C. Eldred, Rochester, Monroe county, New York, August 25.

This instrument consists of a rectangular piece of wood, or other substance, which may be two or more feet in length. It may be four inches broad and an inch and a quarter thick. A mortise is to be made through the middle of this piece, the sides of which mortise should be bevelled, to show the spirit levels to be placed within it, of which there are to be two, one at the side, and one at the end. This constitutes the whole instrument, and the patentee very truly informs us that it is "somewhat *similar* to the common spirit level."

The claim is to the instrument as described.

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50. For an improvement in *Bedsteads;* William Gamble, city of Baltimore, August 25.

Instead of a mortise in the posts, where the rail is to enter, a socket containing a female screw is to be firmly inserted. A screw on each end of the rails, fits into the sockets. The rails are round, and the screws upon their ends have shoulders of the same diameter with the rails. These screws turn upon a pin or mandril, which passes through them, and is secured to the rail; the screws can consequently be turned, and screwed into their sockets without turning the rail. The sacking bottom is attached to each of the rails, in a way described, and by turning the rails it may be tightened in any degree. A bolt passing into a hole in the shoulder of the screw, holds it in its place. Instead of the screw, a piece may be fitted into a socket which shall tighten by a slight turn, in a way very similar to some bedstead fastenings now in use.

The claim is to the foregoing arrangement.

The only objection which we see to this improvement, is its expense. The swivelling screw and its appendages, must very considerably enhance the cost of a bedstead, and prevent it from coming into general use. If well made, the apparatus would undoubtedly operate satisfactorily.

51. For improvements in the *Manufacture of Sugars;* Lemuel Wellman Wright, a citizen of the United States, now residing in the city of London, in England, August 25.

There are three objects intended to be accomplished by the arrangements now patented. The first, is an improvement in the evaporating apparatus. The second, the application of a peculiar solvent for the purpose of removing the molasses from the granulated sugar, without injuring the sugar; and the subsequent recovering of a part of this solvent. Thirdly, an apparatus for drying the sugar, and recovering the remainder of the solvent.

In the apparatus for evaporating, four, or more, pans may be used, one only of which need be of the improved construction. This pan, which may be of copper, is to be double, and the space between the two pans is to be two-thirds filled with a strong solution of chloride of calcium, [oxymuriate of lime.] Such a solution may boil at a temperature of about 250 or 260 degrees of Fahrenheit, and will therefore apply a safe and efficient heat to the pan containing the sugar. There is a safety apparatus described and figured, to prevent accidents from the boiling, and a supply apparatus to admit water to keep the solution of chloride at its proper strength. There is also a blowing apparatus, which forces heated air through openings in tubes near the bottom of the boiler, and these, as the contents become concentrated, cause it to be agitated, and to part readily with its remaining water.

The solvent to be used is alcohol, to every gallon of which about half an ounce of strong muriatic acid may be added; this being preferred to the other acids. After the granulated sugar has parted with the larger portion of its molasses by drainage, about a gallon of this solvent is to be inspersed upon every two or three hundred weight of sugar, which will dissolve, and cause a rapid discharge of the impurities. After this, simple alcohol, in the proportion of two or three gallons to a ton, is to be poured on, which will run freely through the sugar, carrying with it the remainder of the impurities. A large proportion of the alcohol may then be recovered for distillation.

The drying apparatus consists of a pan into which the cleansed sugar is to be put. This pan stands upon another containing water, through which convoluted steam pipes pass, and heat the water so as to dry the sugar without injuring it. A cover may be fitted upon the sugar pan to collect and condense the alcohol which will be evaporated from it.

There are many parts to which we have scarcely alluded; the whole, however, are very perfectly represented in the drawings, which, with the specification, exhibit the plan of operating in a very perspicuous manner.

The claim is not to the separate parts, but to that combination and arrangement of the apparatus described, by which the ends proposed are effected.

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52. For improvements in the combination of *Machinery for regulating Heat;* Lemuel Wellman Wright, a citizen of the

United States, now residing in the city of London, England, August 25.

This apparatus is intended to regulate the heat which shall be admitted into hot houses, drying houses, manufactories, dwellings, or any other place where it is required. The principle upon which this regulator acts, is the unequal expansion of metals. If a bar of zinc, and another of steel, are firmly united together throughout their whole length, this compound bar will be curved by any change of temperature. If heated, the greater expansion of the zinc will cause it to form the convex side of the curve, and this convexity will be proportioned to the elevation of the temperature.

Suppose two of these compound bars to be rivetted together by a single rivet in the middle of them, with their zinc sides in contact, these bars will then recede from each other at their ends, by any elevation of temperature; and if these ends be united by joints to the ends of similar bars, their combined action will increase the effect. An apparatus of this kind may be made to open and close a damper, and thus regulate the admission of heat. Several modifications of the instrument are proposed, but all acting on the same principle. We shall hereafter notice a similar arrangement proposed by Dr. Ure.

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53. For a machine for *Making Clapboards from Round Logs;* Herald Whittemore, Worcester, Worcester county, Massachusetts, August 26.

On the 26th day of March, 1820, Messrs. Eastman & Jaquith, of Maine, obtained a patent for a machine for the same purpose with the above. Circular saws are used to cut a round log from the outside towards the centre, which, of course, makes the boards feather edged. This machine has been since improved, both by the inventor, and others, and the present patent purports to be a still further improvement. The saw is to consist of four plates of steel, fixed upon the face of a blank wheel, and projecting from it about nine inches; but as they are secured to the wheel by screws passing through slots, their length can be altered. Each exterior end of these four plates has two teeth upon it. From the mode of forming it, it may be called an expanding circular saw.

The apparatus for turning the log, and drawing the carriage back, and its other parts, are described at much length; they are more complex than in the original machine, and we do not perceive any thing about it which should secure it a preference.

The patentee claims as his improvements, the application of blades of steel with teeth to an iron blank wheel; the raising and turning friction rollers; and his particular mode of gearing.

On examining the description of Eastman & Jaquith's machine, published in the fifth volume of Silliman's Journal, it will be found that the principle and general arrangement of the two, are perfectly similar.

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54. For an improvement in the *Machine for Manufacturing*

of Shingles; William Thomas, Farmington, Muskingum county, Michigan Territory, August 26.

There have been several editions of this machine, and but for the date, we should think this one of the oldest. A wheel with cutters upon its periphery, is to revolve upon a shaft. It is to be so contrived as to cut the shingles tapering; by what means, however, we are not told. There is no claim made.

There are a number of good machines for making shingles in useful operation; the present, we are convinced, will not be found to interfere with them.

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55. For an improvement in *Rustall's Family Mill*, called the "Vertical Family Mill;" Elijah Skinner, and John Webster, Sandwich, Strafford county, New Hampshire, August 26.

In this mill the two stones are placed vertically, and they are both made to revolve, but in opposite directions. The claim to "improvement, is the revolution of both stones in opposite directions, and the method of feeding through the shaft."

The feeding through the shaft is effected by a screw, or spiral, formed round it, which serves to carry the grain in between the stones, the horizontal position of which renders such a provision necessary. This machine adds another to the list of portable mills, but presents no claim to a preference; that which it makes to novelty, in the running of both stones in opposite directions, has been long since made, and that more than once or twice.

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56. For a *Fly Wheel Press;* David Evans, city of Philadelphia, August 26.

The description of this press does not describe it; and but for the drawing we should know but little of its various parts. It, however, is represented by the pencil of Mr. Wm. Mason, of Philadelphia, in that style of excellence which distinguishes all his labours in this way.

To this press there are two screws, the heads of which rest on its head block, near to its ends. There is a washer, or collar, upon the shanks of the screws below the head block, which serve to support it. The nuts are in the bed piece, or bottom of the press. Upon the head of each screw there is a cog wheel; between, and turning them both, there is a pinion, all, of course, lying horizontally. An axis rises vertically from the middle of the head block, and upon this the pinion turns. Above the pinion, there is a cap which operates as a ratchet wheel, and on the top of this cap there is a horizontal fly wheel. The pinion is to be turned by a lever passing into a socket on the ratchet wheel cap. In pressing, the lever operates upon the pinion through the medium of the ratchet, whilst the lever may be turned back for a new purchase without withdrawing it from the socket.

This is called a fly wheel press, but we are at a loss to discover any real use in this appendage. When the screws are to be brought

down to their bearing it offers some advantage, as the motion may then be rapid; but in some other cases, it must be disadvantageous. We see no provision for turning the screws back, and this cannot be done by the lever whilst the rachet is in operation. There are slides in the usual situation of the cheeks, which serve to steady the cap and follower, or platten, in their descent.

The press patented by Charles Evans, of Philadelphia, June 13th, 1831, see last volume p. 346, has two screws, operating as cheeks, and these are specially claimed in a way which appears to embrace the principle of the present patent.

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57. For an improvement in the mode of *Making Bee Hives, and Managing Bees;* Abijah Alley, Cincinnati, Hamilton county, Ohio, August 26.

Each hive, or bee house, is to consist of three compartments, separated from each other by a floor, or partition, furnished with slides, which may be drawn out, or closed, at pleasure. After the bees have filled the upper compartment, the slides are to be closed, and they then work, in the next below, and so on until the whole are filled. The comb and honey may be removed from those compartments which are filled, without destroying the bees.

Hives were constructed in this way at least half a century since, and although the plan may be new to the patentee, it is old to all those who have fully informed themselves respecting the history and mystery of bees.

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58. For a *Hydrostatic Safety Valve* for the boilers of steam engines; Thomas Ewbank, city of New York, August 27.

(The specification was published in the last No.)

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59. For *Cutting Tenons by Revolving Cylinders;* Josiah Fay, Hollis, Hillsborough county, New Hampshire, August 29.

Two cylinders are made to revolve, one above the other, and are capable of being removed nearer together, or further apart. Upon their faces they carry cutters, in the form of plane irons set askew, and from their edges project small spurs, or cutters, which cut the shoulders of the tenons. The piece to be cut lies in the direction of the axes of the cylinders, upon a sliding frame prepared for the purpose.

The machine, as drawn, appears to be unnecessarily complex; an error by no means uncommon in the first formation of instruments of this kind. The patentee claims "the cutting of tenons by revolving cylinders," as his own invention or discovery.

The cylinders have their bearings behind that part upon which the cutters are placed, as these ends must stand out like a chuck in the mandril of a lathe, otherwise the piece to be tenoned could not pass between them.

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60. For a *Machine for filtrating Water and other Liquids:*

James Barron, Esq. of the United States Navy, city of Philadelphia, August 30.

There is to be a tub which is to contain the water or other liquid to be filtered; the bottom of this tub is to be perforated in the centre, a circular hole being cut of any required diameter; into this hole a cylindrical vessel is to be fastened, the top of which will be flush with the bottom of the tub, and is to extend downwards as far as may be required. A grating is to rest upon a rim at the lower end of this cylinder, and another grating, filling the cylinder, is to be fixed on the bottom of an iron screw rod. A bar crosses the top of the tub, and has a female screw in its middle, through which the screw rod works, being turned by a crank at top. Into the cylinder pieces of sponge are to be put, and these by turning the screw rod, will be compressed between the two gratings: this pressure is to be such that water, or other liquid, will just pass through. The quantity of sponge may be varied, as also may the pressure, until that which is found best is obtained.

The claim is to "the before described machine for filtrating water and other liquids through sponge compressed." We apprehend that it would have given greater security, had the patentee claimed the filtering of water through compressed sponge, by means of the foregoing machine, or any other acting upon the same principle, as it certainly would not be difficult to construct a machine, different in its form, and in the arrangement of its parts, in which the same effect should be produced.

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61. For a *Washing Machine;* Jesse Barber, Sweden, Monroe county, New York, August 30.

A trough is to be made, the bottom of which is to consist of rounds, placed so as to form the segment of a circle. A frame is to vibrate over these rounds, suspended as in many other patent washing machines; rounds are to be attached to the bottom of this frame to act upon the clothes; so far all is old enough; but the novelty claimed is the allowing half the rounds which form the bed, and half those which form the vibrating segment to roll on pivots at their ends, whilst the others are made fast. The next inventor may leave one-fourth at rest, and allow three-fourths to turn.

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62. For a *Churn;* Zuri S. Doty, Bridgewater, Susquehanna county, Pennsylvania, August 31.

This, we are told, "may with propriety be called a self-propelling machine," although a person must be constantly employed to turn a crank. A heavy fly wheel is to run vertically, and upon its shaft there are to be two cranks standing in opposite directions; these are to work two levers, the opposite ends of which act upon the dashers. The churn is of the ordinary vertical kind, but the dasher is divided into two parts, one of which ascends, whilst the other descends.

What there is of novelty in this invention is left to conjecture, there being no claim, and we opine that it possesses but little of this

ingredient. We could point to several churns which operate very much like this, but have no time to devote to an inquiry so little likely to be useful.

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63. For an improvement in the *Application of the Wheel, Pinion and Crank, or Pulley, to the Screw in Pressing;* Joseph Tickler, Massillon, Stark county, Ohio, August 31.

This is the common screw press, in which a wheel and pinion are used to act upon the screw. There is to be a horizontal shaft upon which a pinion is to be placed; this pinion takes into a horizontal crown wheel at the head of the screw. In the follower there is a nut in which the screw works, and causes it to descend. The shaft carrying the pinion may be turned by a crank, and upon this shaft a whirl, or pulley, is fixed, for the purpose of suspending a weight by a cord from its periphery, where continued pressure is wanted, as in pressing cheese.

There is no claim made, the patentee probably supposing that the application is altogether new. Many presses, however, have been made in which the power of the wheel and pinion has been employed in the working of the screw.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for an improvement in the construction of the axles or bearings of rail-way, or other wheeled carriages. Granted to ROSS WINANS, *city of Baltimore, July* 20, 1831.

To all whom it may concern, be it known, that I, Ross Winans, have invented an improvement in the construction of the axles, or bearings, of rail-way, or other wheeled carriages, and that the following is a full and exact description thereof.

The axle, with my improved journals, or bearings, may be made straight, and the wheels placed thereon in the usual way; but instead of forming the bearings under the body of the carriage, and within the naves, or hubs, of the wheels, there to sustain the weight of the load, I extend the axles out at each end, projecting beyond the naves to such a length as shall enable me to form them into gudgeons. The lengths and diameters of these gudgeons, I regulate according to the load they are intended to sustain, and to other circumstances. In all cases, however, the value of my invention depends upon the gudgeons having their diameters as small as a due attention to the strength required will allow. The causing the axles to run in boxes, or upon bearings without the naves, admits of their being made much smaller than usual, the degree of diminution which I have found to answer well in practice, will hereafter be stated. They should be formed of good wrought iron, and case-hardened; or overlaid, or cased, with the best steel and hardened, which materially diminishes the extent of bearing surface necessary to enable them to receive and resist the pressure of the load, and their tendency to wear; they may

therefore be short, and are consequently strong, when of, comparatively, very small diameter.

The tendency to lateral movement is checked, or limited by forming the end, or point of the axle, or gudgeon, so as to be met occasionally by the external cap, or cover, of the gudgeon box, when lateral pressure occurs.

By placing the bearing outside, (as aforesaid,) the diameter of the wheels may be enlarged with more advantage than formerly, as the axles between the wheels may be made of any required strength, (to resist the increased stress thrown on to that part of them by an enlargement of the wheels,) without affecting the size, or strength, of the bearing journals.

By the foregoing means, the leverage of the wheels, (or the mechanical advantage with which the moving power acts, to overcome the resistance to motion,) is increased, and consequently the friction or resistance to motion in rail-road carriages, diminished to a greater extent than heretofore.

This improvement in the axles and journals of rail-way carriages, was devised and carried into operation on my experimental rail-way, and exhibited to various persons in the early part of the year 1827; and it was put into practical operation, under my direction, on the Baltimore and Ohio, and on the Liverpool and Manchester, rail-roads, in the early part of 1829, in connexion with another improvement for the further diminution of friction, by means of a revolving bearing, or friction wheel, for which other improvement a patent was granted to me on the 11th of October, 1828.

I constructed for use, on the latter of the before mentioned roads, a number of cars with the axles and journals, or gudgeons, of various descriptions and dimensions; the gudgeons, or immediate place of bearing for the load, varied from $1\frac{1}{4}$ to $2\frac{1}{4}$ inches in diameter, and from $1\frac{3}{4}$ to three inches in length. Some of them were made of wrought iron, and case-hardened, and some of iron overlaid with steel and hardened. The axles between the wheels were mostly of wrought iron of from $2\frac{1}{2}$ to three inches in diameter. Several cars, however, were constructed with hollow cylindrical cast iron axles, secured to the wheels by flanches on the ends of the axle, and bolts, the gudgeons being separate pieces firmly fixed into the naves of the wheels. (Wood may also be used for the axle to keep the wheels in their parallel relation to each other, with steeled gudgeons, as aforesaid, to receive the bearings.)

The result of experience by the practical use of those cars for the conveyance of loads from three to six tons, and under various circumstances, is that, (for the support of a given load,) the gudgeons or bearing for the load might, in the manner herein specified, be safely used of from one-third to one-half less in diameter than those in common use, without impairing, but rather increasing, the strength and durability of a car; and the diameter of the wheels finding a less early practical limit, it is evident that a saving in the moving power is effected, as the power acts at a mechanical advantage equivalent to the increased ratio of the diameter of the wheel to that of

the axle. These gudgeons, so constructed, were exhibited by me in England, as before stated, and have been adopted there without my deriving any advantage therefrom; as, by the laws of that country, I could not secure the invention by patent, after having publicly exhibited it.

The object of the invention, and a practical demonstration of its utility having been shown, its application and adaptation to the different rail-road carriages, burthen wagons, locomotive engines, &c. and to the different bearing boxes that may be preferred for different purposes, (either revolving, or common,) will be evident, and easy, to any person acquainted with the building of rail-way carriages. But to render it still more so, the following general directions and proportions are given, which I think will be found to be a near approximation to what will be required in practice. When it is intended to convey loads of from two and a half to three and a half tons, and to use wheels of from two and a half to three feet in diameter, the general diameter of the axles may be from two and three-fourths to three inches, and extending through and beyond the naves of the wheels on each side, far enough to go under and conveniently receive the side frame of the load bed, and to have their ends turned, or formed into gudgeons about two and a half to three inches in length, and from one and a half to two inches in diameter. On the four gudgeons thus formed, the carriage body rests by means of any hard metal bearings attached to the before mentioned side pieces; which side pieces are so framed with the cross pieces of the bed as to go on the outside of the wheels, either over or under the gudgeons, as convenience may require. The friction occasioned by the tendency to a lateral movement of the gudgeon is limited by causing the end cover of the bearing to meet the end of the gudgeon as near to the centre of action as possible. When my revolving box is intended to be used, this end is attained by forming the end perfectly square; and when the common box is used, by forming the end of the gudgeons convex or rounding.

In consequence of the small extent of bearing surface embraced by the bearing on the journal, the bearing box, (to guard against wear,) should be made as hard as the use of the most favourable materials for that purpose would permit. The oiling or lubrification of the gudgeons may be effected in any of the usual or convenient ways. But to guard as much as possible against the oil working from the gudgeons on to the rail wheels, it is adviseable to turn one or two small rings, or grooves, on a portion of the axle between the gudgeon and the nave of the wheel, which will obviate that difficulty. I do not intend to be understood as claiming all merely projecting axles with bearing beyond, or external to, the wheels; the single wheel of Sargeant's and of Palmer's rail-way carriage, for single rail-ways, had projecting axles, and several kinds of rail-way carriages have been devised with four wheels, each having separate axles, with both inside and outside bearings, with a view to turning curves with facility. A carriage was made at Liverpool, in England, at a later date than my invention, with outside bearings of the usual size for the pur-

pose of using a broad body, temporarily, and without any view to the object of this improvement, nor effecting the like purpose. My invention is sufficiently distinguished from all others before known and used by the new and useful effect produced in the manner aforesaid.

I therefore declare that the improvement, or improvements, above explained and described, in diminishing the resistance to motion in wheeled carriages to be used on rail-ways, which I claim as my own invention, is the extending the axles each way outside of a pair, or pairs, of wheels, far enough to form external gudgeons to receive the bearing box of the load body, and diminished as aforesaid, with a view to lessen the resistance of friction, as small as its situation, with the use of the most favourable metal for wear, will permit. Thus conveniently increasing the leverage of the wheels, without impairing their effective strength or durability.

ROSS WINANS.

Fig. 1.

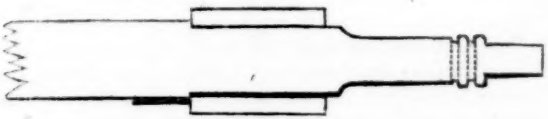


Fig. 2.

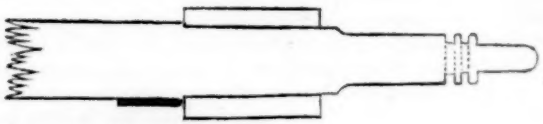


Fig. 1. Axle with flat end.
Fig. 2. Axle with round end.
The dotted lines show the rings or grooves.

Specification of a patent for an improvement in Lamps for the combustion of evaporable fluids. Granted to ISAIAH JENNINGS, *of the city of New York, August* 1, 1831.

To all whom it may concern, be it known, that I, Isaiah Jennings, of the city of New York, have invented an improvement in the common lamp, which adapts it especially to the combustion of the combination of alcohol and spirits of turpentine, and of other essential oils and ingredients, for the use of which ingredients letters patent of the United States have been already issued to me, and which improvement in the lamp is also applicable to the combustion of other evaporable ingredients not specified in the letters patent above alluded to. And I do hereby declare that the following is a full and exact description of my said improvement in the lamp.

Instead of a tube, constructed in the ordinary manner, for con-

taining the cotton, or other wick, which is in them allowed to project through the tube, or burner, and lighted at the top thereof, I make a brass, or other tube, which I cause to rise to a much greater height above the reservoir, or body, of the lamp than is usually done, say, for example, to the height of two inches. The upper end of this tube I close entirely, or simply drill a small hole through, of such size as may suit the ingredients to be burnt, but not generally exceeding one-thirtieth of an inch in diameter. Through the sides of the tube, and at about half an inch, more or less, from its lower end, where it joins the body of the lamp, I drill four, or any other number of similar holes.

A tube thus constructed forms the principal feature of my improvement; and in order to use this lamp, I insert a wick of cotton, a bundle of fine wire, or of any other fibrous material which will raise the fluid from the lamp by capillary attraction; allowing the wick to raise to the upper end of the tube, and to descend into the fluid the vapour of which is to be burnt.

When this lamp is to be lighted, all that is necessary is to apply flame to the small openings above described, when the vapour which escapes therefrom will be inflamed, and the heat generated by this inflammation operating upon the tube, will increase the evaporation so as to produce a brilliant light, without the destruction of the wick, or other fibrous substance.

What I claim as new, and as my improvement in this lamp, and which is applicable to such lamps as are now in use, is the tube, or burner, for containing the wick, or other fibrous substance, constructed in the manner, or upon the principles, hereinbefore explained.

ISAIAH JENNINGS.

The first English Steam-boat.

THE following description of the first steam-boat, with the accompanying drawing, is extracted from an interesting little pamphlet just published by Mr. Effingham Wilson, entitled "An Account of the Origin of Steam-boats, in Spain, Great Britain, and America; and of their introduction and employment upon the River Thames, between London and Gravesend, to the present time." In enumerating the early practical philosophers of that sublime agent, steam, we regret that the author of the pamphlet has omitted to include the name of the French engineer, PAPIN. If the writer be not already apprised of this inaccuracy, he will find an account of the man and of his work, in the "*Recueil Industriel*," No. 54, for last June,* in one of the series of papers upon steam engines, written by Monsieur Arago, who, with some show of justice, claims, on behalf of Pepin, the honour of being the first to apply the agency of steam for the purposes of navigation.

Jonathan Hulls' work was printed in the year 1737, Papin's in 1695—42 years anterior to Hull's. In a subsequent edition of his

* See vol. iv. of this journal, p. 363.

entertaining and tasteful little book, our author will doubtless refer to the paper we have quoted, and, (if he feel that Monsieur Arago has made out his case,) render justice to the foreigner, on the score of priority of invention. At all events, this is the earliest known drawing of a steam-boat.

"The object now to be noticed, is the first steam-boat projected in Great Britain, by Jonathan Hulls, who obtained a patent for his invention, dated the 21st day of December, 1736.

"In the following year he published a tract,* containing a description of his machinery, the title of which is presented to the reader at length, as it contains the interesting fact in the history of steam navigation, that the first attempt was directed to the single purpose of towing ships. 'A description and draught of a new invented Machine, for carrying Vessels or Ships out of, or into, any Harbour, Port, or River, against Wind and Tide, or in a Calm, for which his Majesty has granted Letters Patent, for the sole benefit of the Author, for the space of fourteen years. By Jonathan Hulls. London: Printed for the Author. 1737.'

"From this authentic source the most ample details may be obtained; and in justice to the ingenious inventor, such as it is adviseable to extract shall be given in his own words.

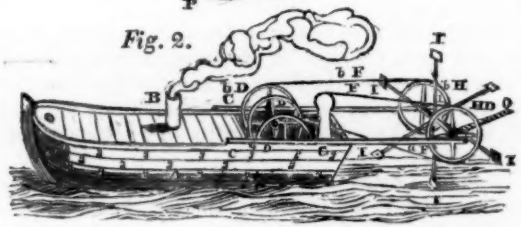
"The author introduces the description of his engine and the boat machinery, with the following general observations:—'Whereas several persons concerned in the navigation have desired some account of my invention for carrying ships out of, and into, harbours, ports, and rivers, when they have not a fair wind. But I could not fully describe this machine without writing a small treatise of the same, in which I shall endeavour to demonstrate the possibility and probability of the matter undertaken. There is one great hardship lies too commonly upon those who propose to advance some new, though useful scheme, for the public benefit. The world abounding more in rash censure, than in a candid and unprejudicial estimation of things, if a person does not answer their expectations in every point, instead of friendly treatment for his good intentions, he too often meets with ridicule and contempt. But I hope this will not be my case, but that they will form a judgment of my present undertaking only from trial. If it should be said that I have filled this tract with things that are foreign to the matter proposed, I answer, there is nothing in it but what is necessary to be understood by those that desire to know the nature of that machine that I now offer to the world, and I hope that, through the blessing of God, it may prove serviceable to my country.' Then follows a long explanation, with definitions and demonstrations of the nature of the powers called into action, for which the reader is referred to the work itself; omitting the full recital here, because

* This tract has been reprinted by Mr. Partington at the end of his Lectures on the Steam Engine, and it is introduced there with the following note. "This highly curious tract, which the editor has been permitted to copy, throws considerable light on the history of steam navigation. Its great rarity, however, has hitherto prevented its contents becoming generally known to the scientific world, a single copy having been sold for more than *three guineas*."

it is more desirable to proceed at once to the description of the boat and machinery."

Fig. 1.

Fig. 2.



Explanation of the wood engraving representing the first Steam-boat projected in England.

Fig. 1.

In some convenient part of the tow-boat there is placed a vessel about two-thirds full of water, with the top close shut. This vessel being kept boiling, rarifies the water into steam; this steam being conveyed through a large pipe into a cylindrical vessel, and there condensed, makes a vacuum, which causes the weight of the atmosphere to press on this vessel, and so presses down a piston that is fitted into this cylindrical vessel, in the same manner as in Mr. Newcomen's engine with which he raises water by fire.

P. A pipe coming from the furnace to the cylinder.

Q. A cylinder.

R. A valve that stops the steam from coming into the cylinder, whilst the steam within the same is condensed.

S. A pipe to convey the condensing water into the cylinder.

T. A cock to let in the condensing water when the cylinder is full of steam, and the valve P is shut.

U. A rope fixed to the piston that slides up and down the cylinder. This rope, U, is the same that goes round the wheel D in the machine.

Fig. 2.

A. The tow-boat.

B. Chimney coming from the furnace.

C, C. Two pieces of timber framed together, to carry the machine.

Da, D, Db. Three wheels on one axis, to receive the ropes F, Fa, Fb.

Ha, Hb. Two wheels on the same axis with the fans I, I, I, I, I, I, which move alternately in such a manner, that when the wheels Da, D, and Db, move backward or forward, they keep the fans in a direct motion.

Fb. A rope going from Hb to Db, that when the wheels Da, D, and Db move forward, moves the wheel Hb forward, which brings the fans forward with it.

Fa. A rope going from the wheel Ha to the wheel Da, that when the wheels Da, D, and Db move forward, the wheel Ha draws the rope F, and raises the weight G, at the same time that the wheel Hb brings the fans forward.

When the weight G is so raised, while the wheels Da, D, and Db, are moving backward, the rope Fa gives way, and the power of the weight G brings the wheel Ha forward, and the fans with it, so that the fans always keep going forward, notwithstanding the wheels Da, D, and Db, move backward and forward as the piston moves up and down the cylinder.

L, L. Teeth for a catch to drop on from the axis, and are so contrived that they catch in an alternate manner, to cause the fans to move always forward, for the wheel Ha, by the power of the weight G, is performing its office, while the other wheel Hb goes back in order to fetch another stroke.

The weight G must contain but half the weight of the pillar of air pressing upon the piston, because the weight G is raised at the same time as the wheel Hb performs its office, so that it is in effect two machines acting alternately by the weight of one pillar of air, of such a diameter as the diameter of the cylinder is!

[*Rep. Pat. Inv.*

Improved Dividing Machine.

The Society of Arts have this month awarded their Gold Isis Medal to Mr. Andrew Ross, for some extremely ingenious and useful improvements in the dividing machine.

The first improvement consists in a new mode of obtaining the divisions for circular dividing engines, depending, in the main, on the same principles as have already been employed, but varying in some of the details. Mr. Ross first divides his circle into forty-eight parts, by continued bi or tri sections, or by a combination of each method. The points thus formed being carefully marked on the limb of the circle, the intervals are then subdivided in the following manner:—An arc, equal to one of the spaces to be subdivided, is procured,

and is divided accurately, and to the same degree of minuteness as it is intended to divide the plate of the engine. The radius of this arc is to be equal to that of the engine, and whatever errors there may be in its original divisions, are to be corrected by the following process. A second arc, having an angular value equal to the first, with a radius only one-half or one-fourth as great, is, together with the first, attached and made concentric with the plate of the engine. The divisions of the first are transferred by means of radial lines to the second, the spaces between them being diminished, of course, in proportion to the radii of the respective arcs. When the second arc has received a counterpart of the divisions of the first, it is placed on the circumference of the engine plate, and there fixed, so that the divided arc shall occupy exactly its proper angular space on the limb of the plate. The divisions of the second arc are then transferred to the first or larger one, a single interval on this latter comprising two or four on the former, according as the radius of the one is twice or four times as great as that of the other. In this manner, the errors of any particular intervals become gradually distributed among the rest, and by repeating the process a sufficient number of times are reduced to invisible quantities.

The second branch of Mr. Ross's improvements, consists of the apparatus by which the divisions of the engine plate, corrected as above described, are transferred to the arc of circles of other instruments. This is usually done by means of small teeth, cut on the edge of a large horizontal wheel: these teeth being acted upon by an endless screw, about an inch in diameter. The truth of such an engine depends, first, on a perfect equality between all the teeth in the wheel; and secondly, in an equality in all parts of the spiral formed by the threads of the screw, as well as in the inclination of those threads. The obstacles to perfect success in these particulars arising from slight differences in the density of the metal, or in the sharpness of the cutter, are such as have perhaps never been overcome entirely by the most celebrated artists, however nearly they may have approached it; and the wheel and screw, when once out of the maker's hands, are no longer susceptible of any correction, whatever errors may be discovered.

Mr. Ross's engine consists likewise of two parts, which act as a toothed wheel and endless screw, but so constructed that each tooth of the wheel, and every part of the screw, admit of unlimited correction and adjustment by the person using it. The teeth of the wheel are only forty-eight, and consist of brass cogs into which are tapped steel screws, the axes of which lie in the plane of the wheel, and are at their ends tangents to the circumference. These ends being ground perfectly flat form the virtual faces of the teeth, and capable of being at any time advanced or withdrawn, give, therefore, to the wheel that perfect and constant power of adjustment which has been mentioned. The same power is obtained for the endless screw, by forming it of one deep thin thread, winding round a cylinder four or five inches in diameter. Into this thread are tapped ninety screws, at equal distances, having their axes parallel with the

plane of the cylinder: the ends of these screws forming the stops to those in the cogs of the wheel, and like them, are capable of easy and unlimited correction. Thus the circumference of the wheel is divided into 4.320 equal spaces, every one of which may afterwards be corrected if required. [*Mec. Mag.*

Meteorological Observations for December, 1831.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P. M.	Barometer. Sun rise.	Barometer. 2 P. M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches.	Inches.				Inches.	
⊗	1	32°	30°	29.70	29.80	16	W.	Calm.		Clear—cloudy.
	2	16	26	30.05	30.05	11	W.	Moderate.		Clear day.
	3	30	32	29.80	29.90	15	W. SW.	Blustering.		Cloudy—clear.
	4	14	28	30.24	30.24	7	NW. SW.	Moderate.		Clear day.
	5	28	36	30.05	30.00	25	SSW. SW.	do.		Cloudy day.
	6	38	45	29.80	29.75	28	SW. W.	do.	.52	Fog—rain.
	7	32	33	30.00	30.10	27	N. NE.	do.		Cloudy day.
	8	29	32	30.05	29.85	32	E. SE.	do.		Cloudy—rain.
	9	38	43	29.30	29.00	33	W.	Blustering.	1.80	Flying clouds—rain.
☽	10	28	43	29.70	29.70	33	W. SW.	Moderate.		White frost; cl'r. overcast
	11	30	33	29.60	29.60	29	W.	Blustering.		Cloudy day.
	12	19	36	29.94	30.00	8	W.	do.		Clear day.
	13	25	48	30.00	30.00	30	SW. SW.	Moderate.		Clear day.
	14	35	49	30.15	30.20	31	W.	do.		Clear day.
	15	34	50	30.24	30.24	32	W.	do.		Clear day.
	16	33	50	30.24	30.30	35	W. NW.	do.		Clear day.
⊗	17	30	48	30.15	30.10	37	NE. SE.	Calm.	.3	Cloudy; hazy; rain in n't.
	18	44	56	29.99	29.90	50	SW. SW.	do.	.1	Flying clouds—clear.
	19	51	56	29.80	29.83	39	SSW. W.	Blustering.		Cloudy; cl'r; snow in n't.
	20	38	46	30.05	30.05	29	W.	Moderate.	.21	Cloudy—flying clouds.
	21	32	36	29.85	29.90	30	W.	do.		Clear day.
	22	29	30	30.30	30.30	13	N.	do.		White frost—clear.
	23	16	33	30.30	30.30	19	NE. E.	do.		Clear—cloudy.
☾	24	25	44	30.00	30.00	28	NE.	do.	.81	Rain—snow.
	25	36	36	29.63	29.90	26	W.	do.		Clear day.
	26	4	8	30.10	30.20	6	W.	do.		Clear day.
	27	5	8	30.30	30.30	5	W.	do.		Clear day.
	28	5	25	30.30	30.30	12	SW. SW.	do.		Clear—cloudy.
	29	22	31	30.29	30.10	19	NE. S.	do.		Cloudy day.
	30	24	38	29.60	29.60	33	NE. NW.	do.	.00	Rain.
	31	20	32	29.90	29.94	19	W.	do.		Cloudy—clear.
	Mean	26.07	34.48	29.98	29.95	24.6			3.98	

	Thermometer.	Barometer.
Maximum height during the month,	56. on 18th & 19th.	30.30 on 27th & 28th.
Minimum do.	5. below zero on 27th.	29.00 on 9th.
Mean do.	30.27	29.97